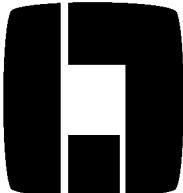


PHOT-XIIS

MODEL 505

DENTAL X-RAY

Service Manual

 **Belmont**[®]

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1. Adjustment required when parts are replaced

Following two kinds of adjustment are necessary if the x-ray head or PC board is replaced.

Replaced part Adjustment	Head	Timer PC board	Power PC board
Change the CP value as indicated on the head yoke. [Refer to section 4A.3 or 5.8]	Necessary	Necessary	Not Necessary
Automatic adjustment of preheating power [Refer to section 4A.6 or 5.11]	Necessary	Necessary	Necessary

2. Method to measure mA and kV

Actual tube current (mA) and tube potential (kV) can be checked by the following procedure.

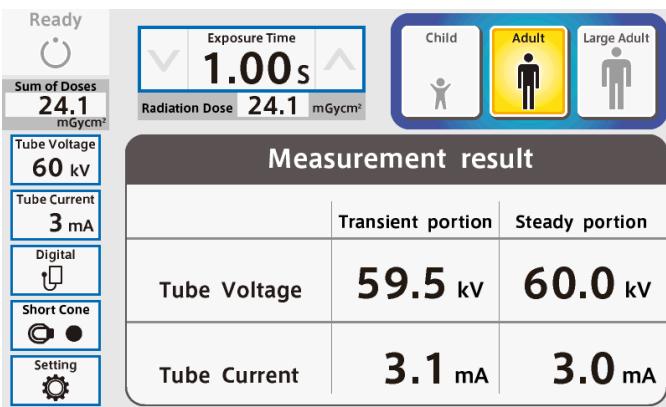
2-A. LED sub controller

1. Turn the main switch on and set the exposure time at 1 sec. and 60 kV, 3 mA
2. Make an exposure and keep the exposure switch depressed continuously after the exposure is over.
3. Keeping the exposure switch depressed, press kV selection switch twice. KV measured value will be displayed on the LED window. This value should be 60 ± 5 kV.
4. Keeping the exposure switch depressed, press mA selection switch twice. MA measured value will be displayed on the LED window. This value should be 3 ± 1 mA.
5. Release the exposure switch and change the setting to 70 kV, 6 mA.
6. Make an exposure and keep the exposure switch depressed continuously after the exposure is over.
7. Keeping the exposure switch depressed, press kV selection switch twice. KV measured value will be displayed on the LED window. This value should be 70 ± 5 kV.
8. Keeping the exposure switch depressed, press mA selection switch twice. MA measured value will be displayed on the LED window. This value should be 3 ± 1 mA.

2-B. LCD sub controller

1. Turn the main switch on and set the exposure time at 1 sec. and 60 kV, 3 mA
2. Make an exposure and keep the exposure switch depressed continuously after the exposure is over.
3. Keeping the exposure switch depressed, touch kV selection button or mA selection button. KV measured value and mA measured value will be displayed on the LCD screen. Steady portion values should be 60 ± 5 kV and 3 ± 1 mA.
4. Release the exposure switch and change the setting to 70 kV, 6 mA.

5. Make an exposure and keep the exposure switch depressed continuously after the exposure is over.
6. Keeping the exposure switch depressed, touch kV selection button or mA selection button. KV measured value and mA measured value will be displayed on the LCD screen. Steady portion values should be 70 ± 5 kV and 6 ± 1 mA.



3. Error Code

3A. Meaning, cause and solution for each error code

3A.1 Error Code: E.00

Meaning

The exposure switch was released during x-radiation.

To release

Press either button for tooth selection.

Measures

Explain that the operator must continue pressing the exposure switch until the exposure light goes out (and alarm stops sounding).

If not resolved

Possible cause

Contact failure of the exposure switch or contact failure occurred due to disconnection in a curl cord of a hand switch during the exposure.

Verification

Take the exposure switch or the hand switch from the timer PC board and check continuity of the cables.
(Pay special attention to the cord bush and connectors.)

Solution

Replace the exposure switch or the hand switch if any failure is found.

3A.2 Error Code: E.01

Meaning

The exposure switch was pressed within three seconds after power-on.

The exposure switch was pressed within ten seconds after previous exposure.

To release

Release the exposure switch to restore the original state.

Solution

Explain that the operator must wait to press the exposure switch for three seconds after power-on (until the ready light is on) and that exposure is allowed only after an interval 30 times the length of the last exposure time.

If not resolved

Possible cause

Contact fault occurred in the exposure switch or contact failure occurred due to disconnection in a curl cord of a hand switch in the middle of exposure.

Verification

Take the exposure switch or the hand switch from the PC board and check continuity of the cables. (Pay special attention to the cord bush and connectors.)

Solution

Replace the exposure switch or the hand switch if any failure is found.

3A.3 Error Code: E.02

Meaning

The exposure switch was pressed when the line voltage was less than 90% of the rated voltage.

To release

Release the exposure switch to restore the original state.

Verification

Measure the voltage between L and N of the power supply terminal block.

Solution

Increase the line voltage using a step-up transformer if the supply voltage is less than 90% of the rated voltage.

If not resolved (or if line voltage is within $\pm 10\%$ of rated voltage.)

Possible cause

The memory is out of order.

Verification

Check C.XX setting at overview mode. (Refer to section 3.9.)

Solution

If C.7F is displayed, memory is out of order and timer PC board should be replaced.

3A.4 Error Code: E.03

Meaning

The exposure switch was pressed when the supply voltage was more than 110% of the rated voltage.

To release

Release the exposure switch to restore the original state.

Verification

Measure the voltage between L and N of the power supply terminal block.

Solution

Decrease the voltage using a step-down transformer if the supply voltage is more than 110% of the rated voltage.

If not resolved (or if the line voltage is within the range of $\pm 10\%$ of rated voltage.)

Possible cause

The memory is out of order.

Verification

Check C.XX setting at overview mode. (Refer to section 3.9.)

Solution

If C.7F is displayed, memory is out of order and timer PC board should be replaced.

3A.5 Error Code: E.05

Meaning

Tube current before termination of exposure was less than 2 mA (when 3 mA is selected) or less than 4.5 mA (when 6 mA is selected).

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Make an exposure for 0.05 seconds and check the tube current at steady portion by the method written at section 2. (Method to measure mA and kV)

Solution

If mA at steady portion is not more than 1.9 mA (when 3 mA is set) or not more than 4.2 mA (when 6 mA is set), increase the setting value for h.XX. (Refer to section 4.5.)

If not resolved

Possible cause 1

If mA is not more than 1 mA, the power PC board or the head is out of order.

Solution

X-ray head should be changed. If the tube current is not more than 1 mA after the head is replaced, change the power PC board.

Possible cause 2

If mA is more than 1 mA, but not more than 1.9 mA (when 3 mA is set) or not more than 4.2 mA (when 6 mA is set), tube current might be low at transient period of exposure.

Solution

X-ray head should be changed.

Possible cause 3

The tube current adjusting value is not properly adjusted.

Solution

Increase the setting value for EP.X. (Refer to section 4.2.)

3A.6 Error Code: E.06

Meaning

Tube current immediately before termination of exposure was more than 4 mA (when 3 mA is selected) or more than 7.5 mA (when 6 mA is selected).

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Make an exposure for 0.05 seconds and check the tube current at steady portion by the method written at section 2. (Method to measure mA and kV)

Solution

If mA at steady portion is not less than 4.1 mA (when 3 mA is set) or not less than 7.6 mA (when 6 mA is set), decrease the setting value for h.XX. (Refer to section 4.5.)

If not resolved

Possible cause 1

The tube current adjusting value is not properly adjusted.

Solution

Decrease the setting value for EP.X. (Refer to section 4.2.)

Possible cause 2

The power PC board or the head is out of order.

Verification

Replace the head and check whether the same symptom (Error code E.06) appears again.

Solution

If the same symptom appears, the cause of the error is presumed to lie in the power PC board. In this case, replace the power PC board. If the exposure turns out to be normal, the cause is presumed to lie in the x-ray head.

3A.7 Error Code:E. 07

Meaning

Tube current during the exposure dropped to 1.5 mA or less (when 3 mA is set) or 3 mA or less (when 6 mA is set).

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Make an exposure for 0.05 seconds and check the tube current at steady portion by the method written at section 2. (Method to measure mA and kV)

Solution

If mA at steady portion is not more than 1.4 mA (when 3 mA is set) or 2.9 mA (when 6 mA is set), increase the setting value for h.XX. (Refer to section 4.5.)

If not resolved

Possible cause 1

The arm cable (power line for filament of x-ray tube) is broken.

Verification

Disconnect the arm cable from the head (10P connector) and the power PC board (8P connector) and check continuity of the cable.

1. between #4 (head side) and #4 (power PC board side)
2. between #8 (head side) and #7 (power PC board side)
3. between #9 (head side) and #8 (power PC board side)

Solution

Replace the arm in question (horizontal or balance arm) if any failure is found.

Possible cause 2

The arm cable (tube current feedback line) is broken.

Verification

Disconnect the arm cable from the head (10P connector) and the power PC board (8P connector) and check continuity of #1 (head side) and #2 (power PC board side).

Solution

Replace the arm in question (horizontal or balance arm) if any failure is found.

Possible cause 3

If mA at steady portion is not more than 1 mA, the power PC board or the head is out of order.

Solution

X-ray head should be change. If mA is not more than 1 mA after the head is replaced, change the power PC board.

Possible cause 4

If mA at steady portion is more than 1 mA, but not more than 1.4 mA (when 3 mA is set) or not more than 2.9 mA (when 6 mA is set), mA might be low at transient period of exposure.

Solution

X-ray head should be changed.

3A.8 Error Code: E.08

Meaning

Tube current during exposure rose to 20 mA or above.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Make exposures for 0.1 seconds and check whether the same symptom appears every time.

Solution

Decrease the setting value for h.XX. (Refer to section 4.5.)

If not resolved

Possible cause

The power PC board or the head is out of order.

Verification

Replace the head and check whether the same symptom (Error code E.08) appears again.

Solution

If the same symptom appears, the cause of error is presumed to lie in the power PC board. In this case, replace the power PCB. If the exposure turns out to be normal, the cause is presumed to lie in the head.

3A.9 Error Code: E.09

Meaning

The set value for the preheating power is abnormal when the power is turned on.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Solution

Set the h.XX value to "h.10" at all conditions (60 kV/3 mA, 70 kV/3 mA, 60 kV/6 mA, 70 kV/6 mA).

If the same symptom (E.09) does not appear when the power is turned on again, set the CP value (see 4.3) and perform automatic adjustment of preheating power (see 4.6).

If not resolved

Possible cause

The timer PC board (EEPROM) is out of order.

Verification

Replace the timer PC board and check whether the same symptom (Error code E.09) appears again.

Solution

If the error code disappears, the timer PC board is presumed to be the cause. Replace it.

3A.10 Error Code: E.10

Meaning

The exposure switch is already on, when the power switch is turned on.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Power on after disconnecting CN2 on the timer PC board and check whether the same symptom (E.10) appears. If the hand switch is used, disconnect CN3 as well.

Solution

If the same symptom (Error code E.10) appears even after the connector is disconnected, the cause of the error is presumed to lie in the timer PC board. In this case, replace the timer PC board. If the E.10 does not appear, the cause is presumed to lie in the contact fault in the exposure switch. In this case, replace the exposure switch. If a hand switch is used, connect either of the connectors and check it.

3A.11 Error Code: E.11

Meaning

Tube current of 2 mA or more is detected during preheating.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Solution

There is a failure in the power PC board. Replace the PC board.

3A.12 Error Code: E.12

Meaning

Tube current of 1 mA or more is detected when main power switch is turned on.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Solution

There is a failure in the power PC board. Replace the PC board.

3A.13 Error Code: E.14

Meaning

Tube voltage immediately before termination of exposure was less than 50 kV (when 60 kV is set) or less than 60 kV (when 70 kV is set).

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Make an exposure for 0.05 seconds and check the tube voltage at steady portion by the method written at section 2. (Method to measure mA and kV)

Solution

If kV at steady portion is not more than 50 kV (when 60 kV is set) or not more than 60 kV (when 70 kV is set), increase the setting value for CP.X. (Refer to section 4.3.)

If not resolved

Possible cause

The power PC board or the head is out of order.

Verification

Replace the head and check whether the same symptom (Error code E.14) appears again.

Solution

If the same symptom appears, the cause of the error is presumed to lie in the power PC board and it should be replaced. If the exposure turns out to be normal, the cause is presumed to lie in the head.

3A.14 Error Code: E.15

Meaning

Tube voltage immediately before termination of exposure was higher than 70 kV (when 60 kV is set) or 80 kV (when 70 kV is set).

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

Make an exposure for 0.05 seconds and check the tube voltage at steady portion by the method written at section 2. (Method to measure mA and kV)

Solution

If kV at steady portion is not less than 70 kV (when 60 kV is set) or not less than 80 kV (when 70 kV is set), decrease the setting value for CP.X. (Refer to section 4.3.)

If not resolved

Possible cause

The power PC board or the head is out of order.

Verification

Replace the head and check whether the same symptom (Error code E.15) appears again.

Solution

If the same symptom appears, the cause of the error is presumed to lie in the power PC board. In this case, replace the power PC board. If the exposure turns out to be normal, the cause is presumed to lie in the head.

3A.15 Error Code: E.16

Meaning

Tube voltage during exposure dropped to less than 40 kV (when 60 kV is set) or less than 50 kV (when 70 kV is set).

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Verification

The arm cable (main output line) may be broken. Disconnect the arm cable from the head (10P connector) and the power PC board (2P connector) and check continuity of the cable.

1. between #10 (head side) and #1 (power PC board side)
2. between #5 (head side) and #2 (power PC board side)

Solution

Replace the arm in question (horizontal or balance arm) if any failure is found.

If not resolved

Possible cause 1

The arm cable (tube voltage feedback line) is broken.

Verification

Disconnect the arm cable from the head (10P connector) and the power PC board (8P connector) and check continuity between #7 (head side) and #6 (power PC board side).

Solution

Replace the arm in question (horizontal or balance arm) if any failure is found.

Possible cause 2

The power PC board or the head is out of order.

Verification

Replace the head and check whether the same symptom (Error code E.16) appears again.

Solution

If the same symptom appears, the cause of the error is presumed to lie in the power PC board and it should be replaced. If the exposure turns out to be normal, the cause is presumed to lie in the head.

3A.16 Error Code: E.17

Meaning

Tube voltage during exposure dropped to less than 40 kV (when 60 kV is set) or less than 50 kV (when 70 kV is set).

Meaning

Tube voltage during exposure rose to 80 kV or above.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Solution

If the same symptom appears, it is more likely that the power PC board is the cause. In this case, replace the PC board.

If not resolved

Possible cause

The head is out of order.

Solution

Replace the head.

3A.17 Error Code: E.19

Meaning

Tube voltage during exposure dropped to less than 40 kV (when 60 kV is set) or less than 50 kV (when 70 kV is set).

Meaning

An over current ran the primary circuit of the high voltage transformer.

To release

Turn off the main power switch and confirm all displays go off. Then turn on again.

Solution

If the same symptom appears, it is more likely that the power PC board is the cause. In this case, replace the PC board

If not resolved

Possible cause

The head is out of order.

Solution

Replace the head.

3A.18 Error Code: E.20

Meaning

The exposure switch was pressed when the temperature inside the head was 60C degree or higher.

To release

Release the exposure switch to restore the original state.

Solution

It is highly likely that exposures were conducted irrespective of the duties, and the temperature inside the head rose to 60C degree or higher. Explain that the operator must wait until the temperature drops (until the ready light becomes on) before the next exposure.

If not resolved

Possible cause 1

The arm cable (temperature sensor line) is broken.

Verification

Disconnect the arm cable from the head (10P connector) and the power PC board (8P connector) and check continuity of #6 (head side) and #5 (power PC board side).

Solution

Replace the arm in question (horizontal or balance arm) if any failure is found.

Possible cause 2

The arm cable (signal common line) is broken.

Verification

Disconnect the arm cable from the head (10P connector) and the power PC board (8P connector) and check the continuity between #2 (head side) and #3 (power PC board side).

Solution

Replace the arm in question (horizontal or balance arm) if any failure is found.

Possible cause 3

The head is out of order.

Verification

Disconnect the head connector (10P) from the arm cable and check continuity between #2 and #6 terminals in the head connector.

Solution

Replace the head if no continuity between #2 and #6 terminals is confirmed.

3A.19 Error Code: E.22

Meaning

Communication between the power PC board and the timer PC board was not normal.

To release

Turn off the main power switch and confirm all displays go off. Then turn on the main power switch again.

Verification

The communication line may be broken. Check continuity of the #2 wire of the communication cable.(4P)

Solution

Replace the communication cable if any failure is found.

If not resolved

Possible cause 1

Something is wrong with the communication circuit on the timer PC board.

Solution

Replace the timer PC board.

Possible cause 2

Something is wrong with the communication circuit on the power PC board.

Solution

Replace the power PC board.

3A.20 Error Code: E.23

Meaning

A button other than the exposure switch is already on when the main power switch is turned on.

To release

Release the button in question to restore the original state.

Verification

It is likely that the power was turned on while another button was held down. Dismount the timer PC board from the front cover of the sub controller and then turn on the main power switch.

Solution

Do not tighten screws too much when mounting the timer PC board.

If not resolved

Possible cause

The button on the timer PC board is out of order.

Solution

Replace the timer PC board.

3A.21 Others

Symptom

Nothing was displayed on the display on the sub controller.

Verification

Check whether a fuse has been blown (F01[10A] on the filter PC board and F3[1A] on the power PC board).

Solution

Replace the fuse if it has been blown.

If not resolved

Possible cause 1

The communication cable (power line) is broken. * If the fuse blows again when fuse is replaced, no break exists in the communication cable.

Verification

Check continuity of the #1 and #4 wires of the communication cable.

Solution

Replace the communication cable if any failure is found.

Possible cause 2

The power supply circuit on the timer PC board is out of order.

Solution

Replace the timer PC board.

Possible cause 3

The control power supply circuit on the power PC board is out of order.

Solution

Replace the power PC board.

Symptom

Exposure can not be made although the ready light is on.

Verification

Remove the exposure switch and the hand switch from the PC board and check continuity of the cables. (Pay special attention to the cord bush and connectors.)

Solution

Replace the exposure switch or the hand switch if any failure is found.

If not resolved

Possible cause 1

The communication cable (exposure signal line) is broken.

Verification

Check continuity of the #3 wire of the communication cable.

Solution

Replace the communication cable.

Possible cause 2

The exposure switch circuit on the timer PC board is out of order.

Solution

Replace the timer PC board.

Possible cause 3

The exposure switch circuit on the power PC board is out of order.

Solution

Replace the power PC board.

3B. Error display of LCD sub controller

Error Code E.00 

● Condition
Exposure switch was released before exposure termination.

● Possible solution
Release the exposure switch after the exposure warning indication disappears.
Touch  on the upper right to cancel the error display.

Error Code E.05 

● Condition
Tube current at last portion of exposure was less than 2mA at 3mA setting or less than 4.5mA at 6mA setting.

● Possible solution
Turn off the main power switch and wait for approximately 2min.
Turn on the main power switch and make an exposure again.
If same error code is displayed, call service personnel.

Error Code E.01 

● Condition
Exposure switch was depressed within 10 seconds after the previous exposure.

● Possible solution
There should be a "wait" interval of 30 times the exposure time between successive exposures.
Touch  on the upper right to cancel the error display.

Error Code E.06 

● Condition
Tube current at last portion of exposure was more than 4mA at 3mA setting or more than 7.5mA at 6mA setting.

● Possible solution
Turn off the main power switch and wait for approximately 2min.
Turn on the main power switch and make an exposure again.
If same error code is displayed, call service personnel.

Error Code E.02 

● Condition
Line voltage was less than 90% of rated voltage.

● Possible solution
If this error occurs frequently, ask service personnel to check the line voltage.
Touch  on the upper right to cancel the error display.

Error Code E.07 

● Condition
During the exposure, tube current becomes less than 1.5mA at 3mA setting or less than 3mA at 6mA setting.

● Possible solution
Turn off the main power switch and wait for approximately 2min.
Turn on the main power switch and make an exposure again.
If same error code is displayed, call service personnel.

Error Code E.03 

● Condition
Line voltage was more than 110% of rated voltage.

● Possible solution
If this error occurs frequently, ask service personnel to check the line voltage.
Touch  on the upper right to cancel the error display.

Error Code E.08 

● Condition
During the exposure, tube current becomes more than 14mA.

● Possible solution
Turn off the main power switch and wait for approximately 2min.
Turn on the main power switch and make an exposure again.
If same error code is displayed, call service personnel.

Error Code E.09**Condition**

Memory value is abnormal.

Possible solution

Turn off the main power switch and wait for approximately 2min.

Turn on the main power switch again.

If same error code is displayed, call service personnel.

Error Code E.14**Condition**

Tube potential at last portion of exposure was less than 50kV at 60kV setting or less than 60kV at 70kV setting.

Possible solution

Turn off the main power switch and wait for approximately 2min.

Turn on the main power switch and make an exposure again.

If same error code is displayed, call service personnel.

Error Code E.10**Condition**

Exposure switch or exposure circuit had been ON, when main power switch is turned on.

Possible solution

Turn off the main power switch and wait for approximately 2min.

Turn on the main power switch again.

If same error code is displayed, call service personnel.

Error Code E.15**Condition**

Tube Potential at last portion of exposure was more than 70kV at 60kV setting.

Possible solution

Turn off the main power switch and wait for approximately 2min.

Turn on the main power switch and make an exposure again.

If same error code is displayed, call service personnel.

Error Code E.11**Condition**

Tube current is detected during pre-heating period.

Possible solution

Turn off the main power switch and wait for approximately 2min.

Turn on the main power switch and make an exposure again.

If same error code is displayed, call service personnel.

Error Code E.16**Condition**

1. During the exposure, tube potential becomes less than 40 kV at 60 kV setting or less than 50 kV at 70 kV setting.
2. 2p connector between the main power board and arm or between the arm and tube head is disconnected.

Possible solution

Turn off the main power switch and wait for approximately 2min.

Turn on the main power switch and make an exposure again.

If same error code is displayed, call service personnel.

Error Code E.12**Condition**

Tube current is detected when main power switch is turned on.

Possible solution

Turn off the main power switch and wait for approximately 2min.

Turn on the main power switch again.

If same error code is displayed, call service personnel.

Error Code E.17**Condition**

During the exposure, tube potential becomes more than 80kV.

Possible solution

Turn off the main power switch and wait for approximately 2min.

Turn on the main power switch and make an exposure again.

If same error code is displayed, call service personnel.

Error Code E.19

● Condition

Excess current was detected in primary circuit of high voltage transformer.

! Possible solution

Turn off the main power switch and wait for approximately 2min.
Turn on the main power switch and make an exposure again.
If same error code is displayed, call service personnel.



Error Code E.24

● Condition

The built-in battery has run out.

! Possible solution

Turn off the main power switch and wait for approximately 2 min.
Turn on the main power switch again.
If same error code is displayed, call service personnel.
(If x-ray have to be used immediately, this error can be cancelled by touching  at upper right corner of LCD display).



Error Code E.20

● Condition

1. Exposure switch was depressed when tube head temperature was over 60°C.
2. 8p connector between the main power board and arm or between the arm and tube head is disconnected.

! Possible solution

Turn off the main power switch and wait until temperature goes down.
If same error code is displayed, call service personnel.

Error Code E.22

● Condition

Failure of electrical communication between the main controller and sub controller.

! Possible solution

Turn off the main power switch and wait for approximately 2min.
Turn on the main power switch again.
If same error code is displayed, call service personnel.

Error Code E.23

● Condition

Some switch had been on, when the main power switch is turned on. (Except the exposure switch.)

! Possible solution

Turn off the main power switch and wait for approximately 2min.
Turn on the main power switch again.
If same error code is displayed, call service personnel.

4. Setting Mode

4A. LED sub controller

4A.1 Film type, digital mode and priority light

(1) To enter this mode

Hold down both of the tube current button and the tube voltage button for approximately three seconds.

(2) The status when entering this mode

①The tooth and exposure lights are off. For patient, cone, film/digital mode, tube voltage, and tube current, the lights for prioritized settings are on. The ready light blinks.

②On the seven-segment LED, the film speed number or the sensor sensitivity number, which was set in the prioritized film type/digital mode, is displayed.

(3) Operation and display

①Each time you press the patient, cone, or film type button, the light of your choice is turned on. Pressing the digital mode button turns off the film light and turns on the digital light. Thus, turn on the lights for the settings you want to prioritize at the time of power-on.

②To change the film speed number registered in the film type, press the film type selection button to display the film type you want and the press the Δ or ∇ button to display the film number you want on the seven-segment LED. If you want to change the film number of another film type, select the film type using the film type selection button and then follow the same process as above.

③To change the exposure conditions (tube voltage or tube current) registered in the digital mode, press the digital mode button to select the digital mode. To change the tube voltage or tube current, press the tube voltage or tube current button and turn on the light you want. To change the sensor sensitivity number, press the Δ or ∇ button to display the sensor sensitivity number you want on the seven-segment LED.

④If rectangular collimator is used with short cone, press T4 button and make the short cone light to flash. If long cone with rectangular collimator is used, long cone light should flash.

⑤When you complete the change, turn on the lights for the film type/digital mode you want to prioritize at the time of power-on. Press the T1 button for approximately one second and then buzzer beeps twice and the settings are stored in EEPROM.

⑥Prioritized settings at factory are listed in table 1.

Table 1: Factory settings for priority

Film type	Patient type	Cone	Tube current	Tube voltage
a	Adult	Short	6 mA	60 kV
Film speed (film a)	Film speed (film b)	Digital Sensor speed		
F.09	F.05	d.10		

* F.09 is for D speed (Kodak Ultra-speed film) and F.05 is for F/E speed (Kodak Insight film).

4A.2 Tube current adjustment value

(1) To enter this mode

Hold down the patient/cone/film buttons for approximately three seconds.

(2) The status when entering this mode

①The ready light blinks. The lights for tooth, patient, cone, tube voltage, exposure, film, and digital mode are

off.

②For the tube current light, 3 mA is on.

③The seven-segment LED displays “EP.X”. X represents the tube current adjustment value for 3 mA held at the time. The standard setting is “EP.8”.

(3) Operation and display

①Press the Δ or ∇ button to increase/decrease the tube current adjustment value displayed on the seven-segment LED. Select the value you want and press the patient selection button for approximately one second. Buzzer beeps twice and the value is stored as a new tube current adjustment value for 3 mA.

②Press the tube current selection button and the light for 3 mA is turned off and 6 mA is turned on. Follow the same procedures as above to store a new tube current adjustment value for 6 mA.

③When the change of tube current adjustment value is completed, the standard digital value for tube current is automatically changed in conjunction with the adjustment value stored.

4A.3 Tube voltage adjustment value

(1) To enter this mode

Hold down the patient/cone/ tube voltage buttons for approximately three seconds.

(2) The status when entering this mode

①The ready light blinks. The lights for tooth, patient, cone, tube current, exposure, film, and digital mode are off.

②For the tube voltage light, 60 kV is on.

③The seven-segment LED displays “CP.X”. X represents the tube voltage adjustment value for 60 kV held at the time. The standard setting is “CP.8”.

(3) Operation and display

①Press the Δ or ∇ button to increase/decrease the tube voltage adjustment value displayed on the seven-segment LED. Select the value you want and press the patient selection button for approximately one second. Buzzer beeps twice and the value is stored as a new tube current adjustment value for 60 kV.

②Press the tube voltage selection button and the light of 60 kV is turned off and 70 kV is turned on. Follow the same procedures as above to store a new tube voltage adjustment value for 70 kV.

③When the change of tube voltage adjustment value is completed, the standard digital value for tube voltage is automatically changed in conjunction with the adjustment value stored.

4A.4 Electronic chime ON/OFF

(1) To enter this mode

Hold down the T1 and T2 buttons for approximately three seconds.

(2) The status when entering this mode

①The ready light blinks. The lights for tooth, patient, cone, tube voltage, tube current, exposure, film, and digital mode are off.

②The seven-segment LED displays “bu.X”. X represents the chime status number held at the time.

(3) Operation and display

①Press the Δ or ∇ button to increase/decrease the chime status number displayed on the seven-segment LED. Select the value you want and press the patient selection button for approximately one second. Buzzer beeps twice and the value is stored as a new chime status number. “bu” represents buzzer and the following numbers have the meanings as described below:

0: An electronic chime does not sound when the selection buttons are depressed.

1: An electronic chime sounds when switches are depressed. (Δ ∇ , tooth, patient, cone, tube voltage, tube current, exposure, film, and digital buttons) The roundness of the chime is less than bu.2 setting.

2: An electronic chime sounds when switches are depressed. (Δ ∇ , tooth, patient, cone, tube voltage, tube current, exposure, film, and digital buttons) The roundness of the chime is more than bu.1 setting.

Warning: Exposure warning buzzer and alarm sound of error code can not be eliminated.

②Select the value you want and press the patient selection button for approximately one second. Buzzer beeps twice and the value is stored as a new chime setting value. Factory default is “bu.2”.

4A.5 Manual setting of preheating power

(1) To enter this mode

Hold down the Film and T4 buttons for approximately three seconds.

(2) The status when entering this mode

①The ready light blinks. The lights for tooth, patient, cone, exposure, film, and digital mode are off.

②For the tube voltage light, 60 kV is on.

③The seven-segment LED displays “h.XX”. XX represents the preheating setting value for 60 kV/3 mA held at the time (00 to 3F). The standard setting is “h.20”.

(3) Operation and display

①Press the Δ or ∇ button to increase/decrease the preheating power setting value displayed on the seven-segment LED. Select the value you want and press the patient selection button for approximately one second. Buzzer beeps twice and the value is stored as a new preheating power setting value for 60 kV/3 mA.

②Pressing the tube voltage selection button switches the tube voltage light to 70 kV and the tube current selection button to 6 mA. Follow the same process as above, and the preheating power setting value for 60kV/6mA, 70kV/3mA and 70kV/6mA can be stored.

4A.6 Automatic adjustment of preheating power

(1) To enter the mode

Hold down the T1, T4, and T5 buttons for approximately three seconds.

(2) The status when entering this mode

①The ready light is on. The lights for tooth, patient, cone, exposure, film, and digital mode are off.

②For the tube voltage light, 70 kV is on. For the tube current light, 3 mA blinks for approximately three seconds and then comes on.

③”h.XX” blinks on the seven-segment LED simultaneously with the ② and then “0.50” is displayed.

(3) Operation and display

①Press the exposure switch to make an x-radiation for 0.50 seconds. If the tube current at initial rise falls within the prescribed range, XX specified in (2)- ③ is stored as the preheating power setting value for 70 kV/3 mA, and you will be directed to the adjustment of 70 kV/6 mA. If it falls outside the range, a new “h” value is displayed, and exposure at 70 kV/3 mA shall be conducted again. If the exposure at “h.3C” is conducted but falls lower outside the range, same exposure will be repeated. If the exposure at “h.03” is conducted but falls higher outside the range, same exposure will be repeated. If the tube current is within the prescribed value, you will be directed to the adjustment of 70 kV/6 mA. The interval before the next

exposure is 10 seconds. During this period, the ready light goes off and the “h” value for the next exposure, the tube current light, and the tube voltage light blink.

②When the adjustment of 70 kV/6 mA is completed, buzzer beeps twice and “Fin” is displayed on the seven-segment LED. At this moment, the two “h” values are written to EEPROM. Therefore, if you power off before “Fin” is displayed or move to another setting mode, the “h” values will not be updated. (For 60 kV, same “h” values are stored as 70 kV.)

4A.7 Setting the automatic lock

(1) To enter this mode

Hold down the T3 and T4 buttons for approximately three seconds.

(2) The status when entering this mode

①The ready light blinks. The lights for tooth, patient, cone, tube voltage, tube current, exposure, film, and digital mode are off.

②The seven-segment LED displays “AL.X”. X represents the automatic lock status number held at the time (0 or 1).

(3) Operation and display

①Press the Δ or ∇ button and the seven segment LED displays “AL.0” and “AL.1” in turn. “AL” represents “automatic lock,” and the following numbers have the meanings as described below:

0: If it sits idle for approximately eight minutes while the power is on, it automatically enters the energy-saving mode.

1: If it sits idle for approximately eight minutes while the power is on, it automatically enters the lock mode.

②Select the value you want and press the patient selection button for approximately one second. Buzzer beeps twice and the automatic lock setting is stored. Factory default is “AL.0”.

4A.8 Setting the standard density value for each tooth

(1) To enter the mode

Hold down the T1 and T5 buttons for approximately three seconds.

(2) The status when entering this mode

①The ready light blinks. The lights for patient, cone, tube voltage, tube current, exposure, film, and digital mode are off.

②T1 of the tooth light is on.

③The seven-segment LED displays “b.XX”. XX represents the standard value for T1 density held at the time. Standard XX value is 0 and can be changed between -4 to +4A.

(3) Operation and display

①Press the Δ or ∇ button to increase/decrease the standard density value displayed on the seven-segment LED. By increasing 1 step for the standard density, the exposure time increases 12%.

②Select the value you want and then press another tooth button. Then, the standard density value of the tooth is displayed on the seven-segment LED. Change the value to the one you want as well. The change will be temporarily held until step ③ is finished.

③Press the patient selection button for approximately one second after completing the change of all standard density values. Buzzer beeps twice and the values are stored.

④If all tooth need to be changed to the same steps, press “D” switch and adjust the standard density by pressing the Δ or ∇ and store it by pressing patient switch..

4A.9 Viewing the setting

(1) To enter this mode

Hold down the T5 buttons and the cone button for approximately three seconds.

(2) The status when entering this mode

①The ready light blinks. The lights for tooth, patient, cone, tube voltage, tube current, exposure, film, and digital mode are off.

②The seven-segment LED displays “PX.X”. X.X represents the version number of the program.

(3) Operation and display

①Each time you press the Δ button, the display on the seven-segment LED will change in the order as below and allow you to check the settings. For “t.XX”, the tube current light blinks. For “d.XX” and “Pt.X”, the tube voltage light blinks. The same applies to the tooth light for “b.XX”, and both tube voltage light and the tube current light for “h.XX”

► “P X . X X” → “C . X X” → “t . X X” → “t . X X” → “u . X X” →
“u . X X” → “E P . X X” → “E P . X X” → “C P . X X” → “C P . X X” →
“b u . X X” → “h . X X” →
“A L . X X” → “b . X X” →
“b . X X” → “r d . X X” → “X X . X X”

②Pressing the ∇ button reverses the direction of the display.

③This mode only allows viewing the settings and does not allow any changes.

4A.10 Error History

(1) To enter the mode

Hold down the F and D buttons for approximately three seconds.

(2) The status when entering this mode

①The ready light blinks. The lights for patient, cone, tube voltage, tube current, exposure, film, and digital mode are off.

②T1 of the tooth light is on.

③The seven-segment LED displays the latest Error code that had been displayed. If no error code had been occurred in the past, “---” will be displayed.

(3) Operation and display

①[History Display] If Δ button is depressed, T2 lamp comes on instead of T1 lamp and 7 segment LED will show the second latest error code. Each time Δ button is depressed, lit lamp moves T2 → T3 → T4 → T5 and the error code is displayed until the fifth latest error. If error code is not exist, “---” will be displayed.

②Error code E.02, E.03, E.08, E.09, E.11, E.12, E.17, E.19, E.20 and E.22 are recorded. Even if the error code E.02, E.03 and E.20 occurred several times, one record is stored unless the power of the unit is off.

③[Occurring frequency Display] If T1 button is pressed, all tooth lamp will be off and 7 segment LED indicates the error code and the number of that error code's occurrences. Display starts from the smallest error code and after all error codes are displayed, indication starts from beginning again. Error code not occurred is not displayed in this mode.

④Since the maximum number for occurrence is limited to 15, 15 is displayed even if that error occurred more frequently.

- ⑤If T1 button is pressed again, the error history mode comes back.
- ⑥If C button is pressed more than 1 second in the error history mode, buzzer beeps twice and all history records are cleared and all tooth lamp goes off and 7 segment LED indicates “---”. If there is no history records, pressing T1 button can not change the mode.

4A.11 Number of Exposures

(1)To enter the mode

Hold down the C and D buttons for approximately three seconds.

(2)The status when entering this mode

- ①The lights for ready, patient, cone, tube voltage, tube current, tooth, exposure, film, and digital mode are off.
- ②The seven-segment LED displays “Cnt”.

(3) Operation and display

Since only three digits can be displayed at one time, we use three displays for one indication. Examples are as follows.

If number of exposures is 99, “Cnt”→”000.”→”099”→blank→“Cnt”→”000.”→”099”→repeat

If number of exposures is 999, “Cnt”→”000.”→”999”→blank→“Cnt”→”000.”→”999”→repeat

If number of exposures is 9999, “Cnt”→”009.”→”999”→blank→“Cnt”→”009.”→”999” →repeat

4A.12 Estimated Air Kerma Display Setting

(1)To enter the mode

Hold down the T2 and T5 buttons for approximately three seconds.

(2)The status when entering this mode

- ①The ready light blinks. The lights for patient, cone, tube voltage, tube current, tooth, exposure, film, and digital mode are off.

- ②The seven-segment LED displays “rd.X”. X is display mode number (0 ~ 2) for radiation indication.

(3) Operation and display

- ①If Δ button is depressed, display mode number is increased. If ∇ button is pressed, display mode number is decreased. The meaning of display mode number is as follows.

0 : Radiation is not indicated.

1 : Radiation can be indicated by manual operation. (=pressing P button more than 1 sec.)

2 : Radiation is automatically displayed for 10 seconds after the exposure is finished. Radiation can be displayed by manual operation (=pressing P button more than 1 sec.) also.

- ②Press the P switch (patient type selection switch) until the buzzer beeps twice to store this setting and turn off the main power switch.

- ③Unit for radiation displayed is mGy. This radiation dose is estimated value at the distal end of cone.

- ④Estimated Air Kerma indication is required by IEC60601-2-65 (203.6.4.5).

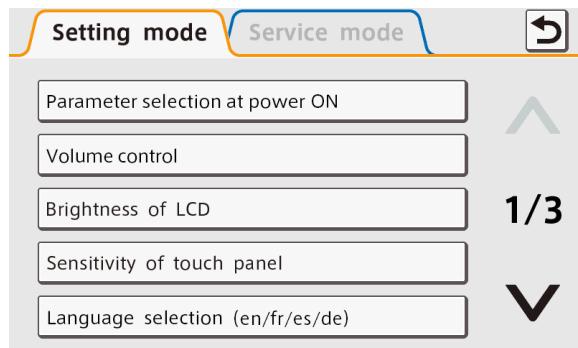
4B. LCD sub controller

4B.1 Menu screen

■ 1st page

When touching the setting switch on lower left corner in the normal mode, the setting mode menu is displayed.

To return to normal mode, touch the return switch on the upper right corner.

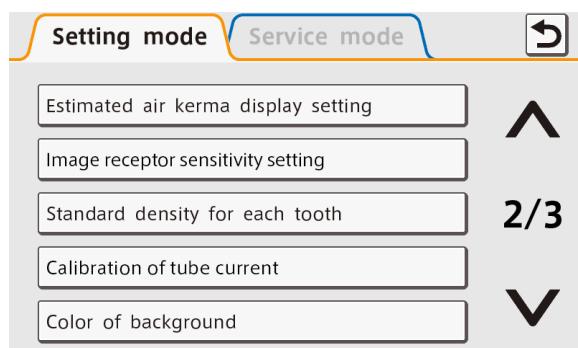


■ 2nd page

Touching **V** switch, the second page of the menu is displayed.

Touching **A** switch, back to the first page menu.

To return to normal mode, touch the return switch on the upper right corner.

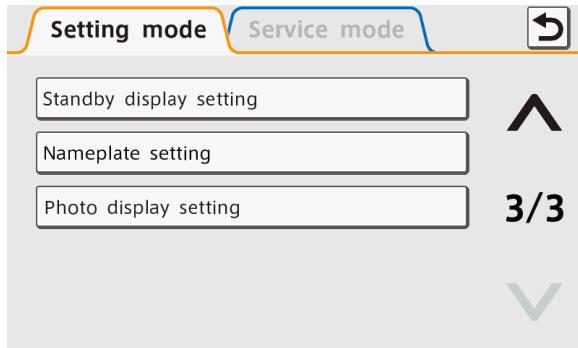


■ 3rd page

Touching **V** switch, is displayed third page of the menu.

Touching **A** switch, back to the second page menu.

To return to normal mode, touch the return switch on the upper right corner.



4B.2 Setting mode 1 (Parameter setting at power on)

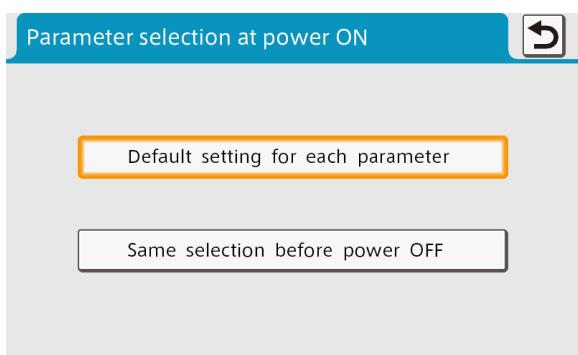
In this mode, you can set the parameter that is selected first when the power is turned on.

First, select one of the following.

- Default setting for each parameter
- Same selection before power off

If "same selection before power off" is selected, the storing chime rings and that setting is stored.

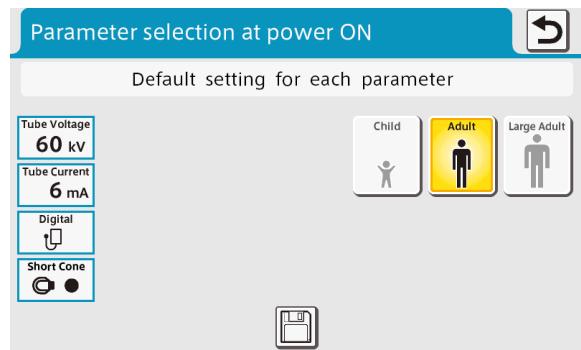
To return to normal mode, touch the return switch on the upper right corner.



If "Default setting for each parameter" is selected, the patient type, tube voltage, tube current, receiver type and cone type can be individually set.

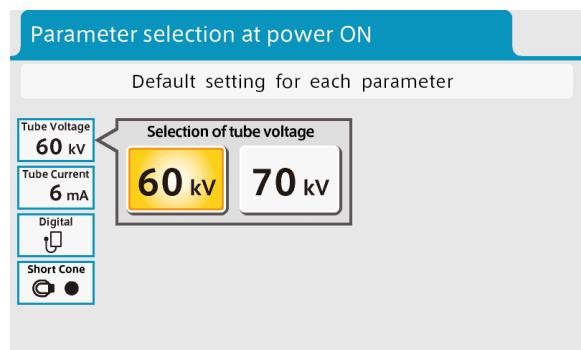
After selecting each parameter, touching the memory switch sounds a memory chime, and the setting values are stored as default values. (Activate everytime with this setting from the next time)

To return to the previous screen, touch the return switch on the upper right corner.



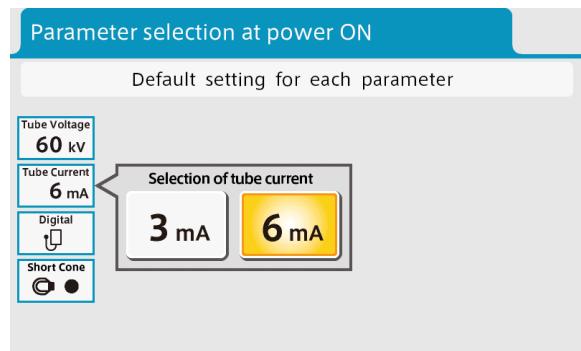
When touching the tube voltage switch, a pop-up screen is displayed.

Select the tube voltage or touch the tube voltage switch again to erase the pop-up screen.



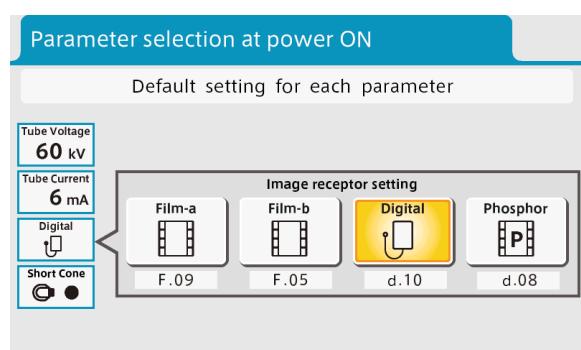
When touching the tube current switch, a pop-up screen is displayed.

Select the tube current or touch the tube current switch again to erase the pop-up screen.

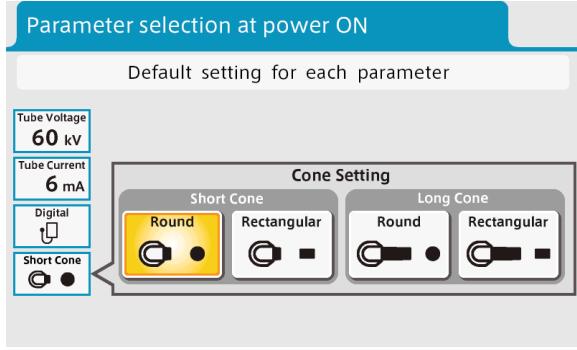


When touching the image receiver switch, a popup screen is displayed.

Select the image receiver type or touch the receiver switch again to erase the popup screen.



When touching the cone switch, a pop-up screen is displayed.
Selecting the cone type or touching the image receiver switch again erases the popup screen.
To return to the previous screen, touch the return switch on the upper right corner.



4B. 3 Setting mode 2 (volume setting)

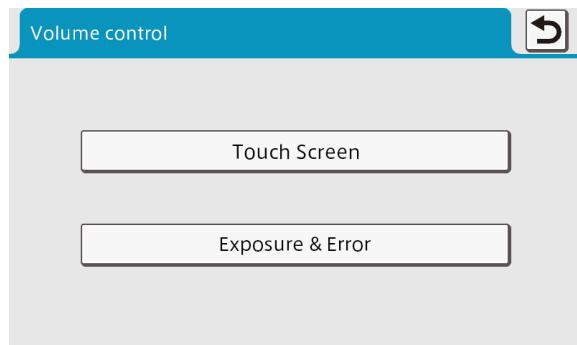
Selection screen

In this mode, you can set the sound volume of speaker.

At first, select one of the following.

- Touch sound of screen
- Exposure and error warning sound

To return to the menu screen, touch the return switch on the upper right corner.



■ Volume setting for screen touch

By touching "touch screen" on the selection screen, you can adjust the volume of the touch sound and the memory chime.

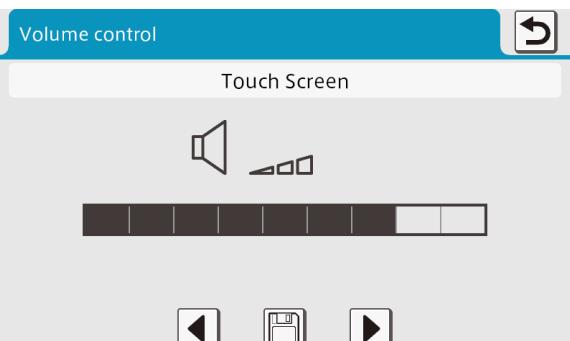
Touching ▶ switch, volume becomes larger.

Touching ◀ switch, volume becomes smaller.

Touch sound changes during adjustment.

When the memory switch is touched after the adjustment, a memory chime rings and the setting value is stored.

To return to the menu screen, touch the return switch on the upper right corner.



■ Volume setting of exposure and error warning

By touching "exposure and error" on the selection screen, you can adjust the sound volume of the exposure and error warning sound.

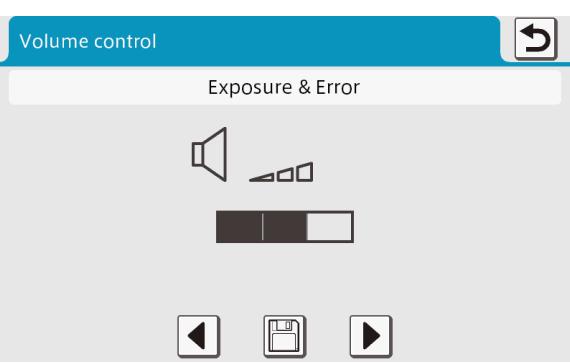
Touching ▶ switch, volume becomes larger.

Touching ◀ switch, volume becomes smaller.

Exposure warning sound changes during adjustment.

When the memory switch is touched after the adjustment, a memory chime rings and the setting value is stored.

To return to the menu screen, touch the return switch on the upper right corner.



4B.4 Setting mode 3 (LCD brightness setting)

In this mode, the brightness of the LCD can be adjusted.

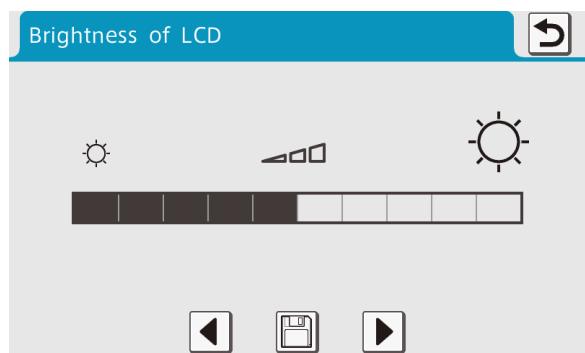
Touching ▶ switch, LCD becomes brighter.

Touching ◀ switch, LCD becomes darker.

Brightness changes during adjustment.

When the memory switch is touched after the adjustment, a memory chime rings and the setting value is stored.

To return to the menu screen, touch the return switch on the upper right corner.



4B.5 Setting mode 4 (Touch panel sensitivity setting)

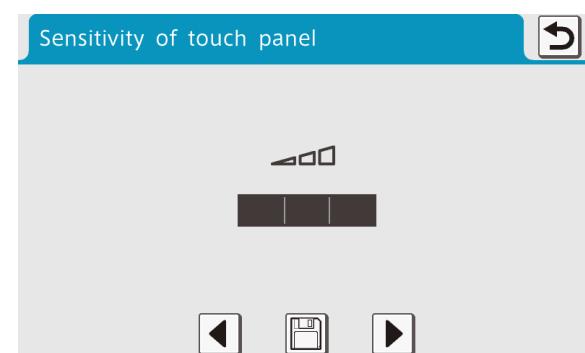
In this mode, the sensitivity of the touch panel can be adjusted.

Touching ▶ switch, sensitivity becomes higher.

Touching ◀ switch, sensitivity becomes lower.

When the memory switch is touched after the adjustment, a memory chime rings and the setting value is stored.

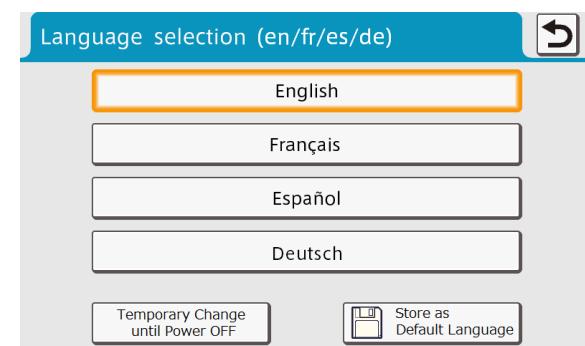
To return to the menu screen, touch the return switch on the upper right corner.



4B.6 Setting mode 5 (language setting)

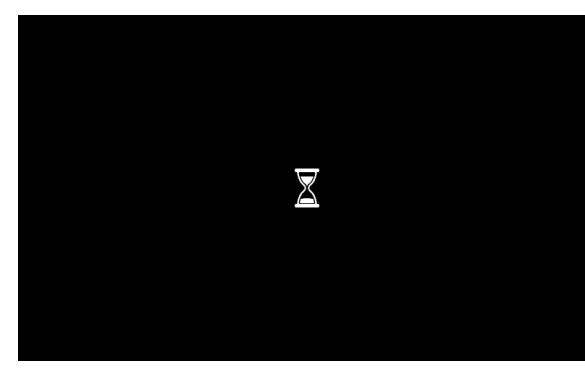
In this mode, it is possible to select the language displayed on the screen.

To return to the menu screen, touch the return switch on the upper right corner.



After the selection of the language, touch either "temporary change" or "save as default language" button and memory chime rings and the language data will be set.

An hour glass is displayed to represent processing.



4B.7 Setting mode 6 (Dose display setting)

■ ON / OFF setting of display

In this mode, dose display can be set.

First, select display ON / OFF .

When "display OFF " is touched, a memory chime rings and that setting is stored.

To return to the menu screen, touch the return switch on the upper right corner.

Estimated air kerma display setting

Display ON

Display OFF

■ Unit Setting

When touching "display ON", a screen for selecting the unit of display is displayed.

When either unit is selected, memory chime rings and the setting is stored.

To return to the previous screen, touch the return switch on the upper right corner.

Estimated air kerma display setting

Selection of unit

mGy

mGycm^2

■ Automatic reset setting of cumulative dose

When setting of display unit is completed, select automatic reset ON or OFF of cumulative dose.

When either button is touched, memory chime rings and the setting is stored.

When "automatic reset ON" is selected, cumulative dose is reset when entering the screen saver mode .

To return to the previous screen, touch the return switch on the upper right corner.

Estimated air kerma display setting

Sum of doses

Auto reset ON

Auto reset OFF

4B.8 Setting mode 7 (Image receptor sensitivity setting)

■ Selection

In this mode, the sensitivity of the image receptor can be set.

At first, select either method to set.

- Manual setting
- Preset setting

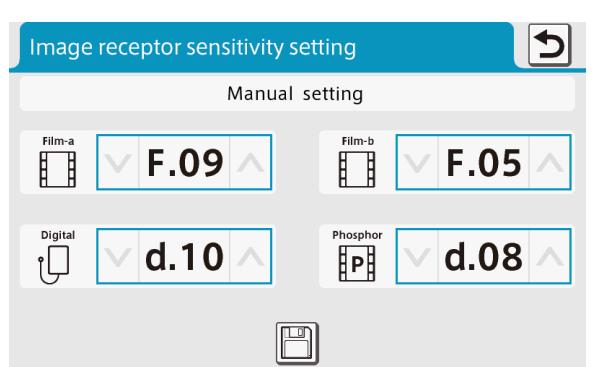
To return to the menu screen, touch the return switch on the upper right corner.

Image receptor sensitivity setting

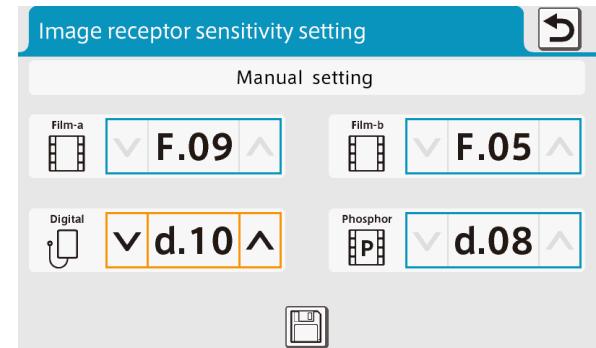
Manual setting

Preset setting

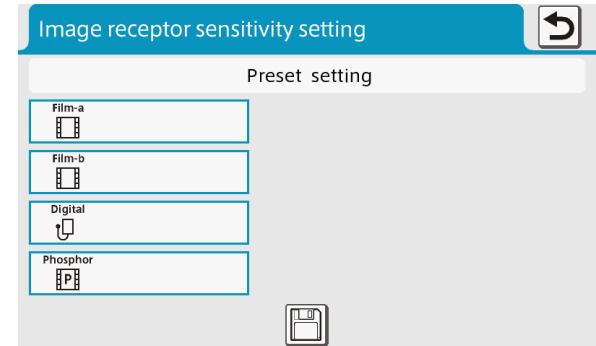
■ Initial screen for Manual setting
 If "Manual setting" is selected, you can manually set the speed number for each image receptor.
 Higher speed number makes image darker.
 Touching the return switch on the upper right corner, return to the previous screen.



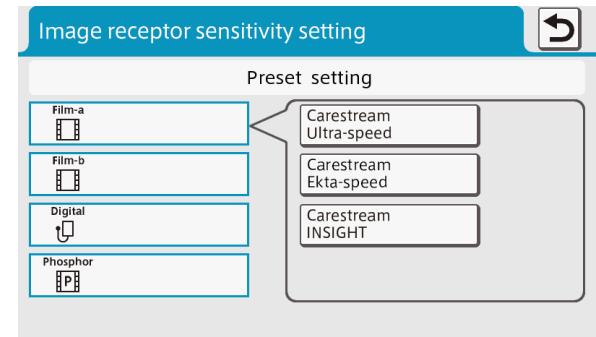
■ Change speed number by manual
 When the speed number of the image receptor is touched, the color of the speed number frame turns orange.
 Touching **A** switch, speed number is increased.
 Touching **V** switch, speed number is decreased.
 After the adjustment, touch the save button to store the setting.



■ Preset setting
 When touching "preset setting" on the selection screen, speed numbers are automatically set by selecting the products registered for each receptor type.
 First, select the receptor type doctor is using.
 To return to the previous screen, touch the return switch on the upper right corner.



■ Setting for Film-a / Film-b
 If doctor is using film, touch the Film-a switch.
 A pop - up screen will appear and selectable products will be displayed. (The same applies to Film-b)
 Touching the same receptor switch again erases the pop-up screen.
 To return to the previous screen, touch the return switch on the upper right corner.

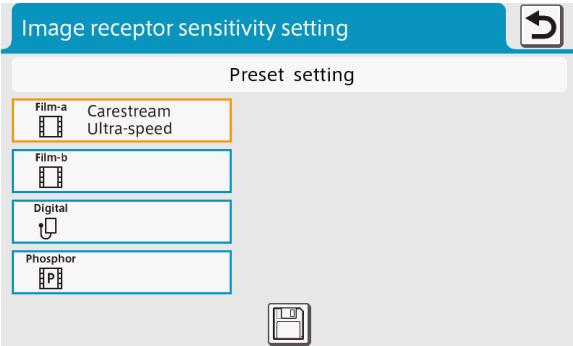


■ Setting for Film-a / Film-b

Touch the model name of the film that doctor is using. Then the name of film selected is displayed in the frame of Film-a.

Touching the save button, the memory chime rings and the setting is stored. (Speed number is stored automatically).

To return to the previous screen, touch the return switch on the upper right corner.



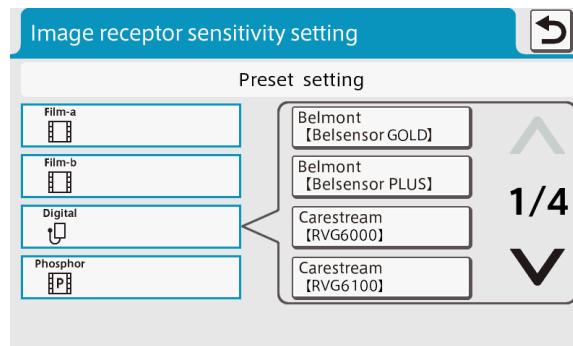
■ Setting for Digital sensor

If doctor is using the digital sensor, touch "Digital".

A pop-up screen is displayed, and selectable digital sensor products are displayed in alphabetical order of the manufacturer over four pages.

To erase the popup screen, touch "Digital" again.

To return to the previous screen, touch the return switch on the upper right corner.

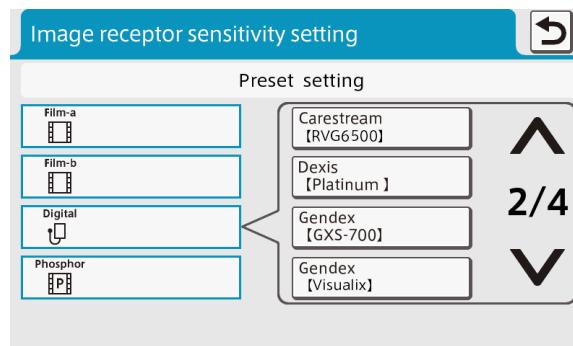


■ Setting for Digital sensor

When touching V switch in the pop-up window, the registered products of the second page is displayed.

Touch A switch to return to the menu of the first page.

To return to the previous screen, touch the return switch on the upper right corner.

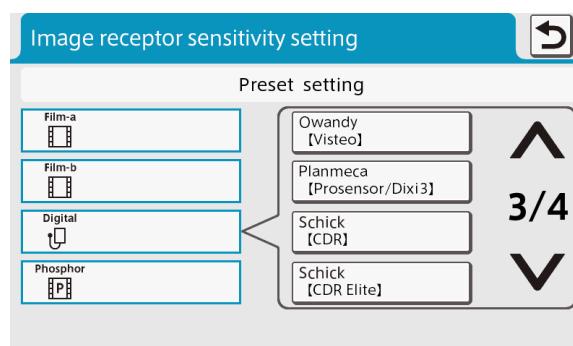


■ Setting for Digital sensor

When touching V switch in the pop-up window, the registered products of the third page is displayed.

Touch A switch to return to the menu of the second page.

To return to the previous screen, touch the return switch on the upper right corner.

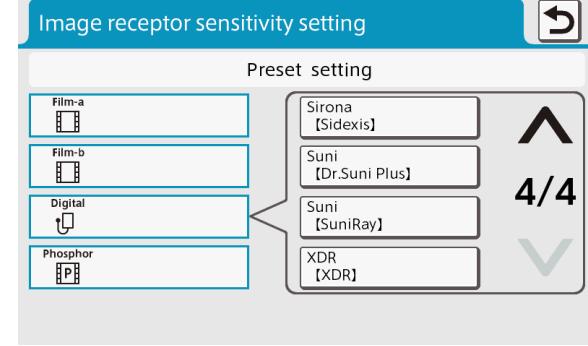


■ Setting for Digital sensor

When touching **V** switch in the pop-up window, the registered products of the fourth page is displayed.

Touch **A** switch to return to the menu of the third page.

To return to the previous screen, touch the return switch on the upper right corner.

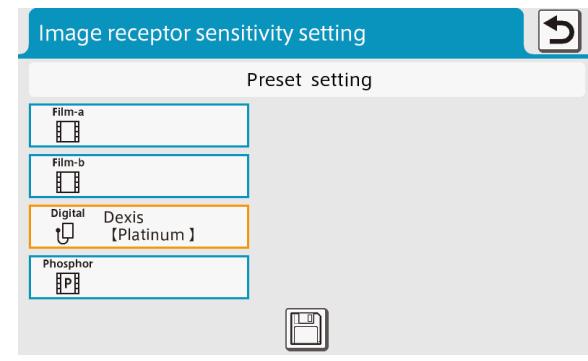


■ Setting for Digital sensor

Find and touch the model name of the digital sensor that doctor is using. Then the name of sensor selected is displayed in the frame of Digital.

Touching the save button, the memory chime rings and the setting is stored. (Speed number is stored automatically).

To return to the previous screen, touch the return switch on the upper right corner.

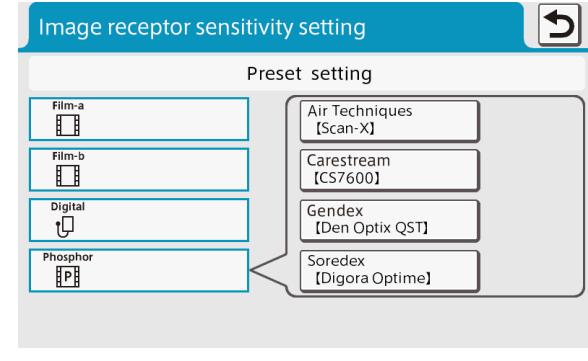


■ Setting for Phosphor plate

If doctor is using the phosphor plate, touch "Phosphor". A pop-up screen is displayed, and selectable phosphor plate products are displayed.

To erase the popup screen, touch "Phosphor" again.

To return to the previous screen, touch the return switch on the upper right corner.

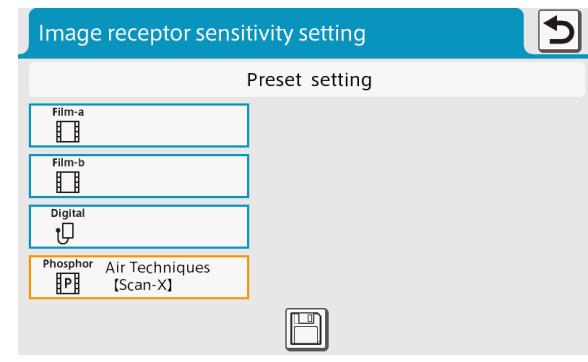


■ Setting for Phoshor plate

Find and touch the model name of the phosphor plate that doctor is using. Then the name of plate selected is displayed in the frame of Phosphor.

Touching the save button, the memory chime rings and the setting is stored. (Speed number is stored automatically).

To return to the previous screen, touch the return switch on the upper right corner.



■ Setting of multiple types

After setting the plurality of receptor types, if the save button is touched, all setting contents are stored at a time. The receptor type indicated by the orange frame (the receptor type set lastly) is stored as the default setting at the time of turning on the power supply.

If the speed number is changed by manual setting, the contents stored by the preset setting are canceled.

Image receptor sensitivity setting

Preset setting

Film-a	Carestream Ultra-speed
Film-b	Carestream INSIGHT
Digital	Dexis [Platinum]
Phosphor	Air Techniques [Scan-X]



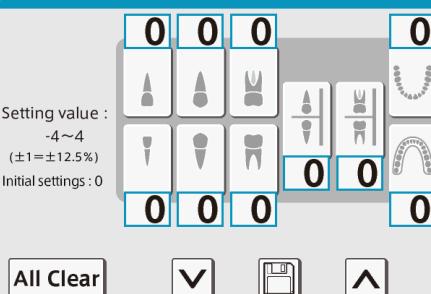
4B.9 Setting mode 8 (setting of reference value for tooth density)

In this mode, the density reference value for each tooth can be changed between -4 to +4.

When shipped from the factory, all reference values are set to 0. Changing the reference value by one step can make exposure time increase or decrease 12.5%.

To return to the menu screen, touch the return switch on the upper right corner.

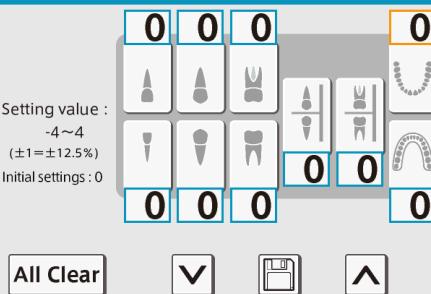
Standard density for each tooth (b.)



When the reference value of the tooth is touched, the reference value frame becomes orange.

Touching **A** switch makes the reference value increased and **V** switch makes decreased. (Reference value for other tooth can also be set in succession.) After the adjustment, touch the save button to store the settings.

Standard density for each tooth (b.)



4B.10 Setting mode 9 (Tube current calibration)

■ Start calibration

In this mode, the preheating power adjustment value (h value) can be automatically adjusted by repeating the actual exposure, and the tube current at transient period can be optimized.

Touch the return switch on the upper right to return to the menu screen.

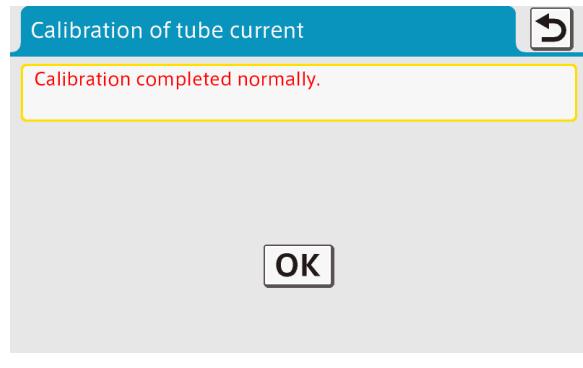
Calibration of tube current

Calibration starts. Please note that X-rays are emitted when the exposure switch is pressed.

OK

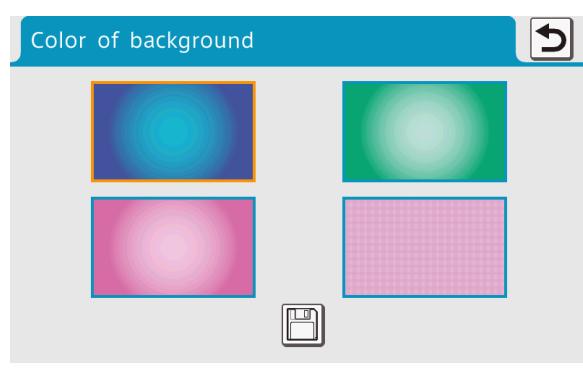
<p>■ Exposure setting</p> <p>When OK button is touched, the exposure conditions are displayed.</p> <p>The exposure time is 0.01 s for the first exposure and it becomes 0.5 s for after it.</p>	
<p>■ Exposure</p> <p>Keep the exposure switch detouched. X-ray is produced and warning sign and sound are produced.</p> <p>As in the normal mode, when the exposure switch is released during exposure, the exposure stops, an error sound is heard and an error "E.00" is displayed.</p>	
<p>■ End of exposure</p> <p>When the exposure is completed, a message instructing to release the exposure switch is displayed.</p>	
<p>■ Radiation standby</p> <p>When the exposure is completed and when the calibration is not completed, the standby screen is displayed.</p> <p>The remaining waiting time is displayed in real time. If it becomes 0 s, a screen for the next exposure appears.</p>	

■ End of calibration
When the calibration is completed, a termination message is displayed.
Touch the OK switch to return to the menu screen.



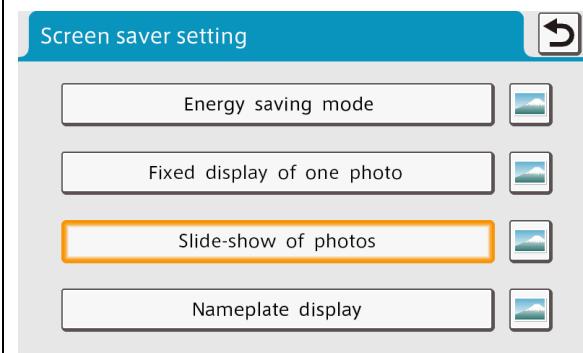
4B.11 Setting mode 10 (Setting background color)

In this mode, the background (color and design) of the normal mode can be changed.
After selecting the desired background, touch the save button to store the setting.
Touch the return switch on the upper right to return to the menu screen.



4B.12 Setting mode 11 (Screen saver setting)

■ Selection screen
When a certain period of time (transition time) passes while leaving the operation panel left, it switches to the screen saver mode. There are 4 settings, "Energy saving mode", "Fixed display of one photo", "Slide-show of photos" and "Name plate display". You can select one setting for the screen saver mode. Before the selection you can check these 4 settings by touching preview button.



■ Preview
On the selection screen, there are four buttons with mountain marks at right side of each selection buttons. These are the preview buttons.
You can check the display by touching these preview buttons. (The right figure is an example of photo fixed display)
After preview, touch anywhere on the screen to return to the selection screen.



<p>■ Transition time setting</p> <p>If “Energy saving mode” or “Slide show of photos” is selected, screen changes to transition time setting.</p> <p>The transition time can be adjusted by And V switch from 5 to 30 minutes in 5 minutes steps.</p> <p>After adjusting the transition time, select the touch switch disable or enable setting. If disable is selected, anywhere of the screen should be touched more than 2second in order to return to nomal mode from screen saver mode. If enable is selected, an instantaneous touch can make it to the normal mode.</p> <p>After selection, touch the save button to store the setting.</p>	
<p>■ Explanation of cancellation method</p> <p>On the transition time setting screen, if you select the switch disabled, an explanation message how to return to the normal mode..</p> <p>Touch the OK button to return to the menu screen.</p>	<p>To terminate the lock mode, hold down somewhere on the screen for about 2 seconds. Then screen will return to the normal mode.</p> <p style="text-align: right;">OK</p>
<p>■ Photo number selection</p> <p>If “Fixed display of one photo” is selected for the screen saver mode, the screen changes to the selection of photo number to display among 10 photos. The orange frame is the currently selected photo number. By touching the preview button on the right of the selection switchs, you can check the content.</p> <p>If the photo number is selected, screen changes to transition time setting. Set the transition time and select the switch enable / disable as explainind above.</p>	
<p>■ Name plate number selection</p> <p>If “Name plate display” is selected for the screen saver mode, the screen changes to the selection of name plate number selection. In the selection screen, select the name plate to be displayed from four plates. The nameplate with orange frame is currently selected. By touching the preview switch on the right of the selection switch, you can see the preview.</p> <p>If the nameplate is selected, screen changes to transition time setting. Set the transition time and select the switch enable / disable as explainind above.</p>	

4B.13 Setting mode 12 (Nameplate setting)

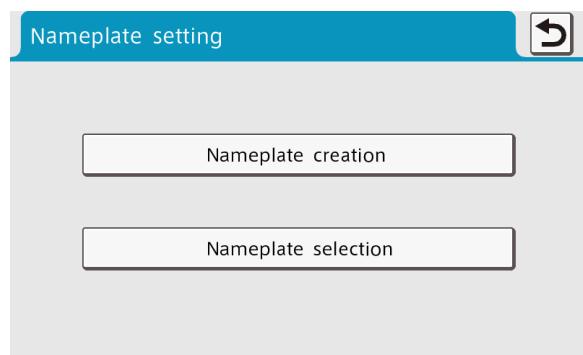
■ Selection screen

In this mode, you can create or select the nameplate that can be displayed in the screen saver mode.

First, select either.

- Nameplate creation
- Nameplate Selection

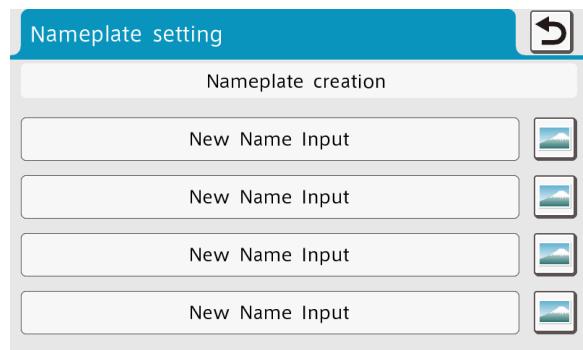
To return to the menu screen, touch the return switch on the upper right corner.



■ Creating a nameplate (selection screen)

Select a nameplate you want to change from four nameplates. (Right figure is an example of the initial state.)

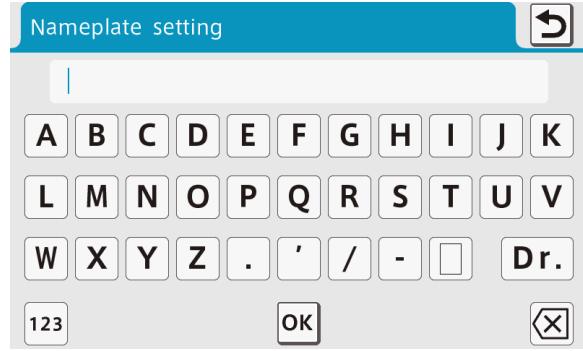
If nameplates were created before, by touching the preview switch on the right of the selection switchs, you can check the contents for each nameplate..



■ Creating a nameplate (name input)

Enter a name to be displayed on the nameplate using the keyboard. 20 characters can be input at maximum.

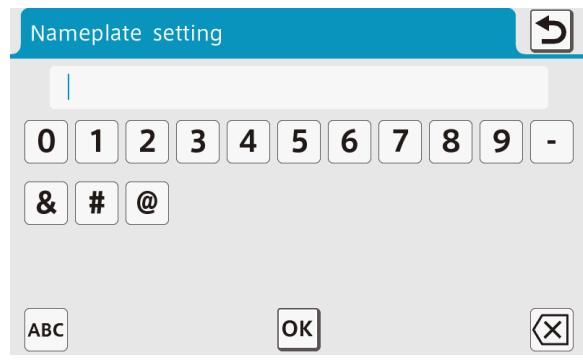
Note : A nameplate consists of a set of characters (upper part) and picture (lower part).



■ Creating a nameplate (name input)

Touch the “123” button to switch to numeric keyboard.

Touch the “ABC” button to return to the alphabet keyboard.



■ Creating a name plate (name input)

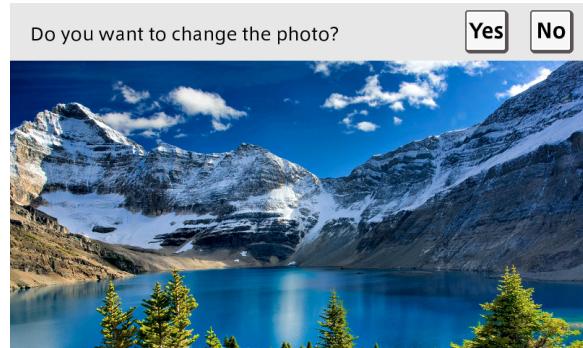
After entering the name, touch the OK button to store the name.



■ Create name plate (Confirmation of photo)

A photo is displayed for the nameplate you are creating. If you want to change the photo, touch “Yes” button. If you want to use the photo as it is, touch “No” button.

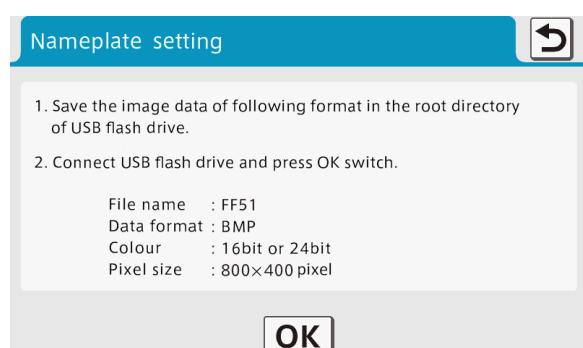
If the “No” button is touched, a memory chime rings and the preview of nameplate is displayed.



■ Create name plate (New photo)

If the “Yes” button is touched on the picture change confirmation screen, an explanation message of change method is displayed.

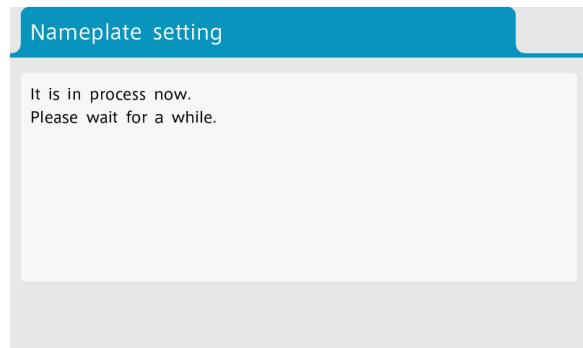
Connect the USB memory containing the image data you want to use. (Right figure is an example of the first nameplate among four.)



■ Create name plate (Photo change)

When the OK button is touched, a memory chime rings, the rewriting processing of the photo is performed, and a message under processing is displayed.

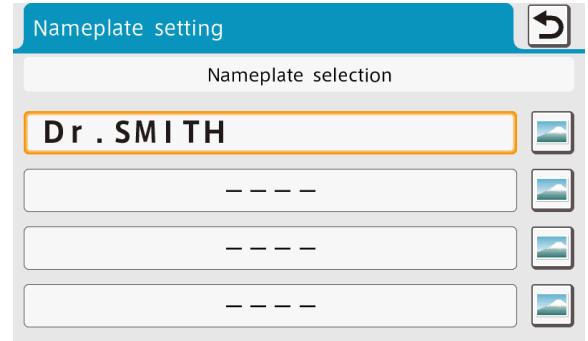
Upon completion of the process, the process shifts to the preview screen.



<p>■ Preview screen</p> <p>In the selection screen, when you touch the preview switch at right side of the selection switch, if the creation of the nameplate has been completed, the preview is displayed.</p> <p>Touch anywhere on the screen to return to the selection screen.</p>
--

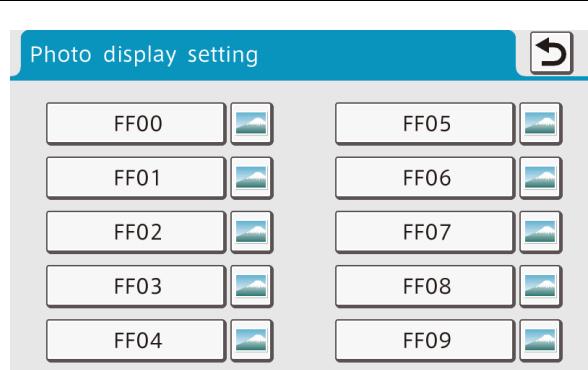


<p>■ Selection of nameplate (selection screen)</p> <p>Select one nameplate you want to display in the screen saver mode among four nameplates.</p> <p>The orange frame is the currently selected nameplate.</p> <p>By touching the preview switch on the right of the selection switch, you can check the contents.</p> <p>When the selection switch is touched, a memory chime rings and the setting is stored.</p>
--



4B.14 Setting mode 13 (Photo display setting)

<p>■ Selection screen</p> <p>In this mode, photo data used in the screen saver mode can be changed to your original data.</p> <p>To return to the menu screen, touch the return switch on the upper right.</p>
--



<p>■ Preview screen</p> <p>By touching the preview switch on the right of the selection switch, you can display the preview.</p>
--



■ Preparation for change

On the selection screen, when you touch the selection switch of the photo you want to change among 10 photos, the explanation for change method is displayed.

Connect the USB flash drive containing the photo data you want to use. (The format of photo should be 16bit or 24bit color, 800 x 480 pixels BMP. File name should be between FF00 to FF09.)

■ Change processing in progress

When the OK button is touched, a memory chime rings, the rewriting processing of the photo is performed, and a message under processing is displayed.

Upon completion of the process, the screen shifts to the selection screen.

Photo display setting



1. Save the image data of following format in the root directory of USB flash drive.

2. Connect USB flash drive and press OK switch.

File name : FF00
Data format : BMP
Colour : 16bit or 24bit
Pixel size : 800×480 pixel

OK

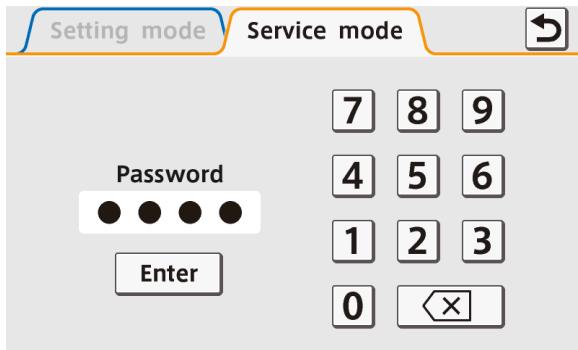
Photo display setting

It is in process now.
Please wait for a while.

5. Service mode (LCD sub controller)

5.1 Password input screen

When the tab of the service mode is touched in setting mode, a password input screen is displayed. If you want to cancel this mode, you can return to the normal mode by touching the return switch on the upper right.

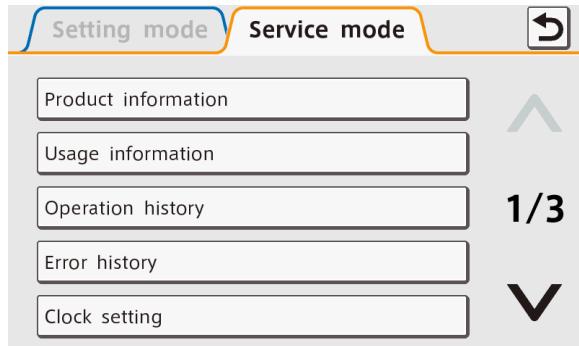


5.2 Menu Screen

■ 1st page

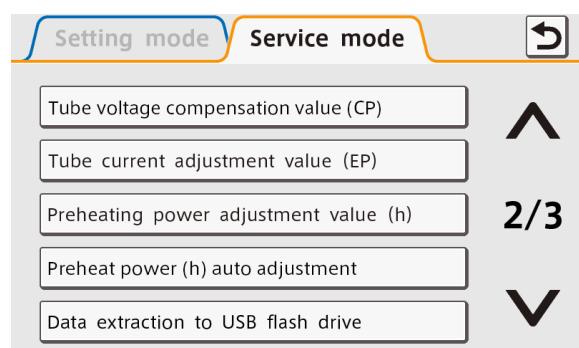
After entering "3461" on the password entry screen, touching the ENTER switch displays the first page of service menu.

If you want to cancel this mode, you can return to the normal mode by touching the return switch on the upper right.



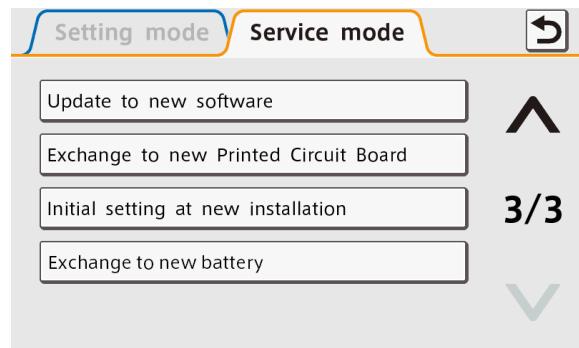
■ 2nd page

If V switch is touched, the 2nd page will be displayed. If A switch is touched, you can return to the 1st page. If the return switch on the upper right is touched, you can return to the normal mode.



■ 3rd page

If V switch is touched, the 3rd page will be displayed. If A switch is touched, you can return to the 2nd page. If the return switch on the upper right is touched, you can return to the normal mode.



5.3 Service mode 1 (Product Information)

Information about the product can be displayed in this mode.

Information are "serial number", "version number of software (main / sub / system image)", "date of manufacture" and "date of the installation".

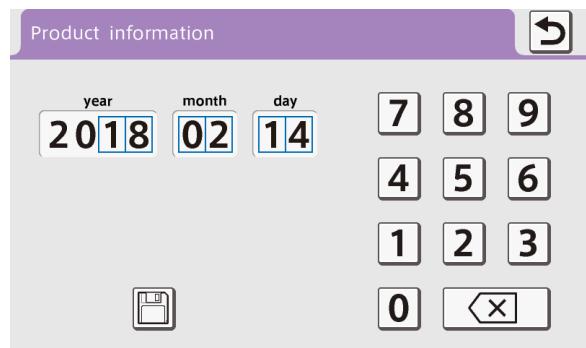
If you want to cancel this mode, you can return to the normal mode by touching the return switch on the upper right.

Product information	
Serial number	EC17L0001
Program version	Main V1.1 Sub V1.3
Version of system images	V1.1
Date of Manufacture (m/d/y)	12/25/2017
Date of Installation (m/d/y)	02/14/2018

■ Correction of the installation date

If the column of installation date is touched more than 2 seconds, correction menu for the installation date will be displayed.

After entering the correct date, touch the memory switch. Chime for memory will sounds and the installation date will be memorized. If the return switch on the upper right is touched, you can return to the former screen.



5.4 Service mode 2 (Usage information)

Information about the usage can be displayed in this mode.

Information are number of days elapsed after the installation, number of days used, total time of exposures and total number of exposures.

If the return switch on the upper right is touched, you can return to the menu screen.

Usage information	
Number of days elapsed	315 days
Number of days used	256 days
Total time of exposures	819.23 seconds
Total number of exposures	7697 times

5.5 Service mode 3 (Operation history)

In this mode, the operation record (the exposure record) can be displayed.

The displayed contents are "the exposure time", "the exposure setting" and "the result of measurement" of latest 10 exposures. The first line is the latest.

When touching a return switch in the upper right, you can return to menu screen.

Date	Setting value			Measurement result			
	kV	mA	Time	Transient	Steady	Transient	Steady
h : m : s m / d / y							
16:38:24 12/25/2018	60	6	0.25	60.5	60.0	5.9	6.0
16:38:11 12/25/2018	60	6	0.25	60.5	60.0	5.9	6.0
16:37:58 12/25/2018	60	6	0.16	60.5	60.0	5.9	6.0
16:37:43 12/25/2018	60	6	0.16	60.5	60.0	5.9	6.0
16:37:29 12/25/2018	60	6	0.14	60.5	60.0	5.9	6.0
16:37:16 12/25/2018	60	6	0.14	60.5	60.0	5.9	6.0
16:37:02 12/25/2018	60	6	0.13	60.5	60.0	5.9	6.0
16:36:47 12/25/2018	60	6	0.13	60.5	60.0	5.9	6.0
16:36:22 12/25/2018	60	6	0.10	60.5	60.0	5.9	6.0
16:36:04 12/25/2018	60	6	0.09	60.5	60.0	5.9	6.0

5.6 Service mode 4 (Error histories)

In this mode, the error histories can be displayed.
("E.00" and "E.01" are not left in the record because of user error.)
Displayed contents are "the occurring date and time", "the error code" and "the error contents" of the latest 10 errors. The first line is the latest error. (The right figure is the example of five errors).
If you want to cancel this mode, you can return to the menu screen by touching the return switch on the upper right.

Error history		
Date (h:m:s m/d/y)	Error	Condition
16:38:24 12/20/2018	E.07	Tube current was low.
14:58:34 12/19/2018	E.05	Tube current was slightly low.
09:21:17 03/22/2018	E.23	Some switch was ON, when Power is turned ON.
11:35:42 02/14/2018	E.02	Line voltage is low.



When touching V switch, the cursor moves one step downward.

When touching A switch, the cursor moves one step upward.

Error history		
Date (h:m:s m/d/y)	Error	Condition
16:38:24 12/20/2018	E.07	Tube current was low.
14:58:34 12/19/2018	E.05	Tube current was slightly low.
09:21:17 03/22/2018	E.23	Some switch was ON, when Power is turned ON.
11:35:42 02/14/2018	E.02	Line voltage is low.



When OK switch is touched after the cursor selection, the operation records of five exposures before the exposure selected by the cursor are displayed.

Error history						
Date	Setting value		Measurement result			
	kV	mA	Time	Transient	Steady	Transient
h : m : s m / d / y						
14:58:34 12/19/2018	60	6	0.25	60.5	60.0	4.2
14:38:11 12/19/2018	60	6	0.25	61.0	60.0	4.9
14:37:58 12/19/2018	60	6	0.16	60.0	60.0	5.1
14:37:43 12/19/2018	60	6	0.16	60.5	60.0	5.6
14:37:29 12/19/2018	60	6	0.14	60.5	60.0	5.9
						6.0

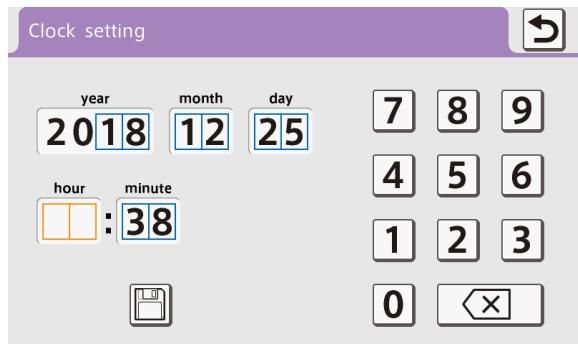


5.7 Service mode 5 (Watch setting)

In this mode, the watch can be set.
If you want to cancel this mode, you can return to the menu screen by touching the return switch on the upper right.

Clock setting		
year	month	day
2018	12	25
hour	minute	7 8 9 4 5 6 1 2 3 0
14	: 38	

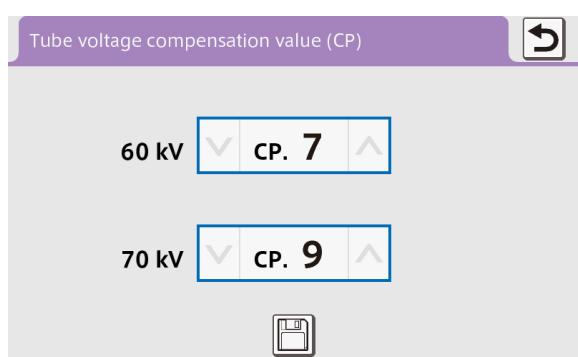
When touching year, month, day, time or second, the color of the chosen setting changes to orange. Enter the figure you want to set. (The right figure is the example to have chosen time). When touching a memory switch after entering all of the figures to want to change, the memory sound sounds and a watch is updated. When the values are the extraordinary combination, it isn't possible to store.



5.8 Service mode 6 (Tube voltage adjustment value setting)

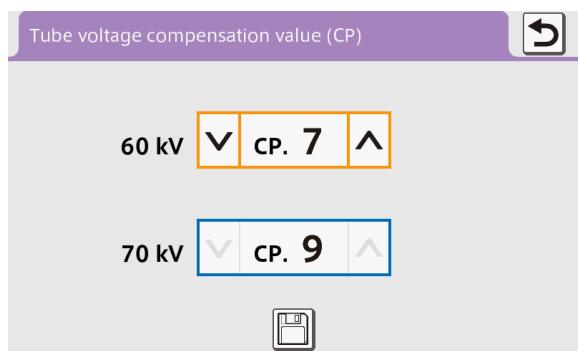
In this mode, the tube voltage adjustment value can be set.

The tube voltage during the exposure can be adjusted slightly by changing a tube voltage adjustment value. If you want to cancel this mode, you can return to the menu screen by touching the return switch on the upper right.

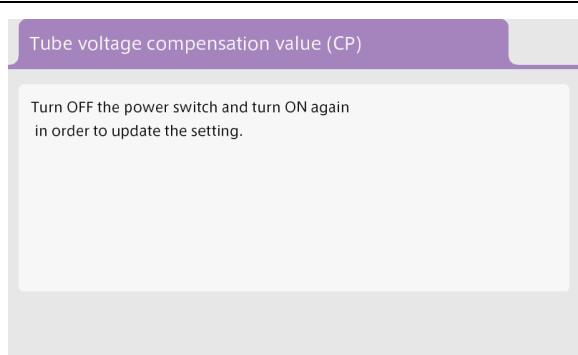


When touching the tube voltage adjustment value, the color of the frame becomes orange, and the value can be changed. (The right figure is the example to have chosen the adjustment value at the 60 kV setting). The value increases when touching Δ switch and decreases when touching a ∇ switch. (0-F) The value changes continuously, if the switch is touched more than one second.

When touching a memory switch, the chime for memory rings and a set value is updated. (By touching this switch after all adjustment values are changed, all the values are stored together.)

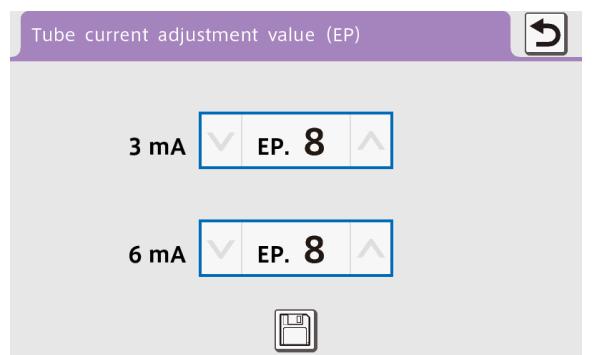


When a set value is updated, the message to instruct to turn off the power is displayed.

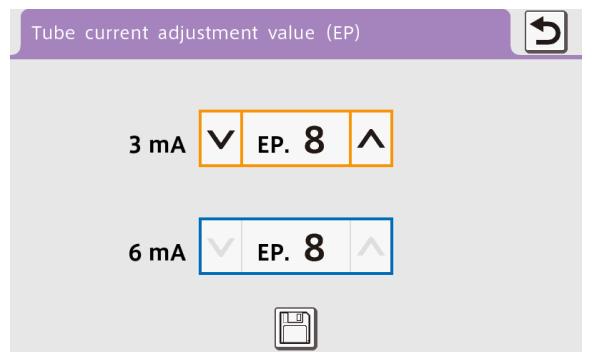


5.9 Service mode 7 (Tube current adjustment value setting)

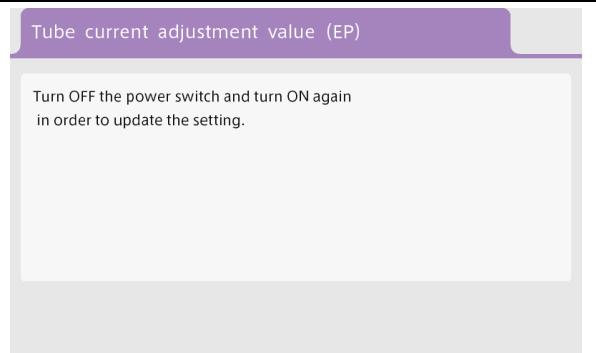
In this mode, the tube current adjustment value can be set.
The tube current during the exposure can be adjusted slightly by changing a tube current adjustment value. If you want to cancel this mode, you can return to the menu screen by touching the return switch on the upper right.



When touching the tube current adjustment value, the color of the frame becomes orange, and the value can be changed. (The right figure is the example to have chosen the adjustment value at 3 mA setting). The value increases when touching \wedge switch and decreases when touching a \vee switch. (0-F) The value changes continuously, if the switch is touched more than one second.
When touching a memory switch, the chime for memory rings and a set value is updated. (By touching this switch after all adjustment values are changed, all the values are stored together.)

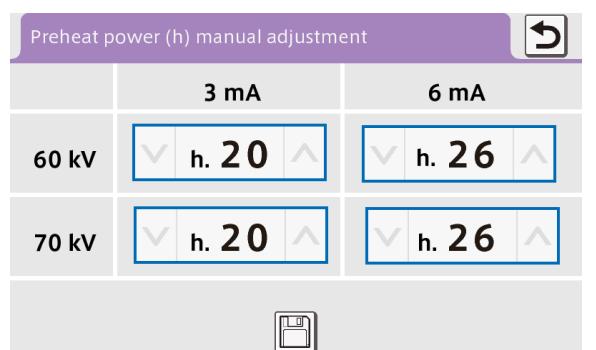


When a set value is updated, the message to instruct to turn off the power is displayed.

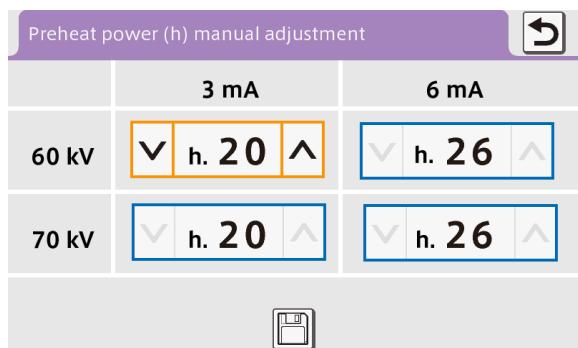


5.10 Service mode 8 (Preheating power adjustment value setting)

In this mode, the preheating power adjustment value can be set.
The tube current at the starting period can be adjusted slightly by changing a preheating power adjustment value. If you want to cancel this mode, you can return to the menu screen by touching the return switch on the upper right.

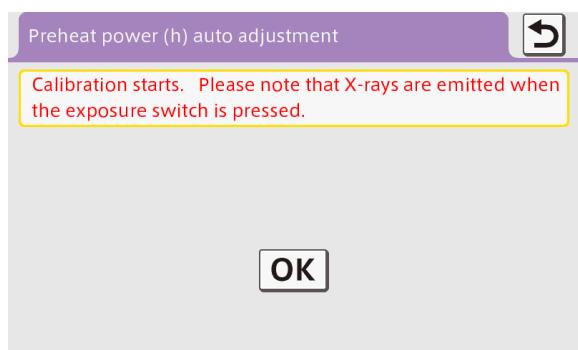


When touching the preheating power adjustment value, the color of the frame becomes orange, and the value can be changed. (The right figure is the example to have chosen the adjustment value at 3mA/60kV setting). The value increases when touching \wedge switch and decreases when touching a \vee switch. (00-3F) The value changes continuously, if the switch is touched more than one second. When touching a memory switch, the chime for memory rings and a set value is updated. (By touching this switch after all adjustment values are changed, all the values are stored together.)



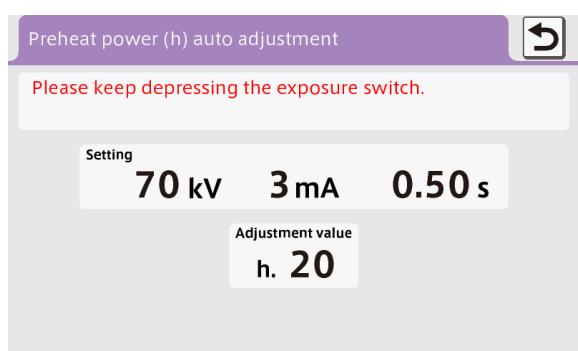
5.11 Service mode 9 (Automatic adjustment of the preheating power)

In this mode, the preheating power adjustment value ("h" value) is self adjusted and the tube current at the starting period can be optimal value. If you want to cancel this mode, you can return to the menu screen by touching the return switch on the upper right.



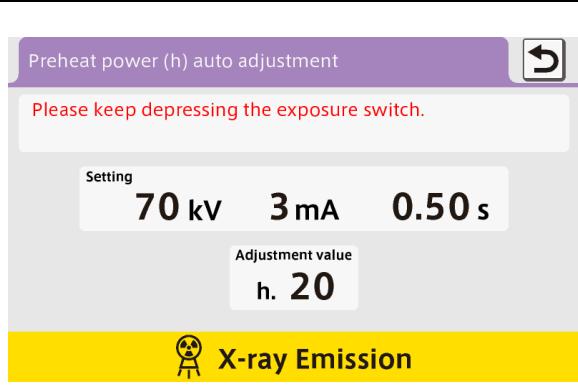
■ Start to adjust

When OK switch is touched, the irradiation conditions are displayed.



■ Making exposure

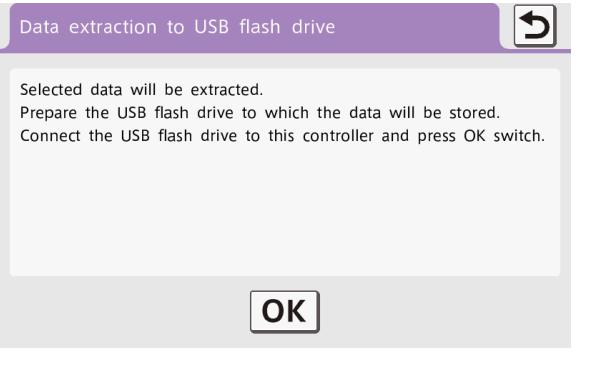
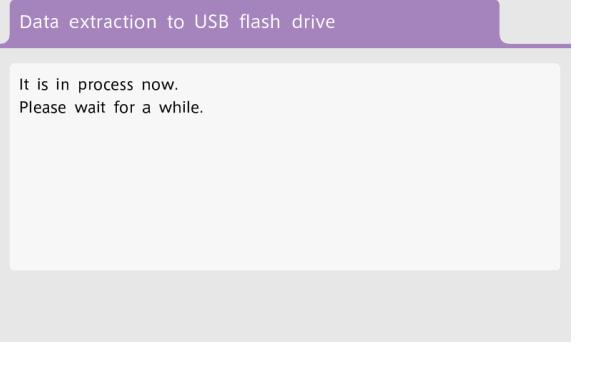
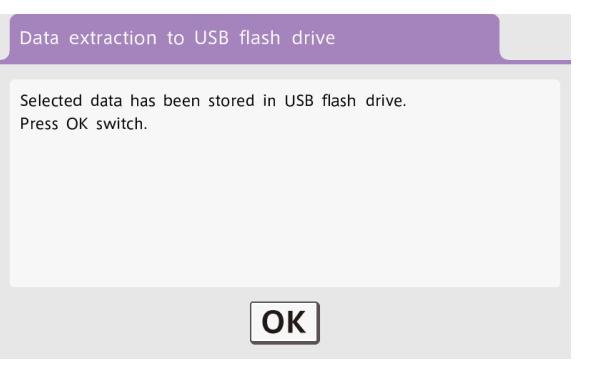
Keep depressing the exposure switch and the exposure warning is displayed with the sound. If the exposure switch is released during the exposure, the exposure will stop and the error "E.00" is displayed.



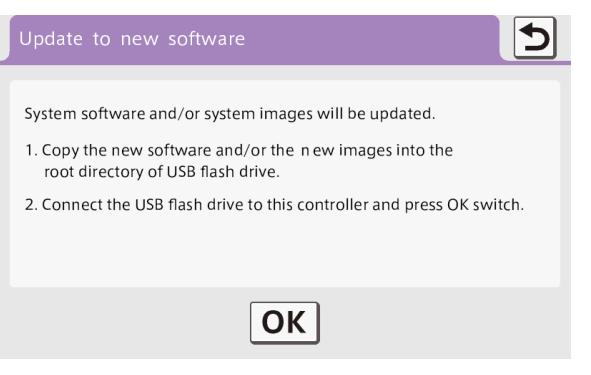
<p>■ The termination of exposure</p> <p>When the exposure is finished, the message to instruct to let the exposure switch release is displayed.</p>	
<p>■ Waiting time for the next exposure</p> <p>When the exposure ends and when the adjustment hasn't ended, waiting time for the next exposure is displayed.</p> <p>When the waiting time becomes 0, it shifts to the exposure beginning screen again.</p> <p>These procedures are repeated until the calibration ends.</p>	
<p>■ End of adjustment</p> <p>When the adjustment ends, an end-message is displayed.</p> <p>When OK switch is touched, it returns to menu screen.</p>	

5.12 Service mode 10 (Data extraction to the USB memory)

<p>■ Selection</p> <p>In this mode, the information stored in the controller can be extracted to the USB flash drive.</p> <p>The data to extract is "values for each settings", "whole setting history", "whole error history" or "whole exposure history". When touching "all of above four data", all data can be extracted.</p> <p>If you want to cancel this mode, you can return to the menu screen by touching the return switch on the upper right.</p>	
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<p>■ Starting the extraction</p> <p>When touching the switch of the information to be extracted, the message to connect USB flash drive is displayed.</p>	 <p>Data extraction to USB flash drive</p> <p>Selected data will be extracted. Prepare the USB flash drive to which the data will be stored. Connect the USB flash drive to this controller and press OK switch.</p> <p>OK</p>
<p>■ Extraction</p> <p>When OK switch is touched, a message during processing is displayed.</p>	 <p>Data extraction to USB flash drive</p> <p>It is in process now. Please wait for a while.</p>
<p>■ The extraction ending</p> <p>When the extraction ends, an end-message is displayed.</p> <p>When OK switch is touched, it returns to the choice screen.</p>	 <p>Data extraction to USB flash drive</p> <p>Selected data has been stored in USB flash drive. Press OK switch.</p> <p>OK</p>

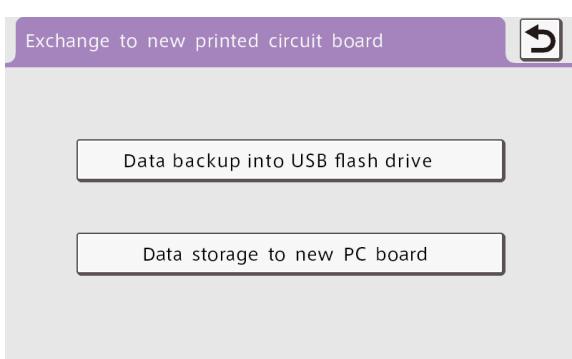
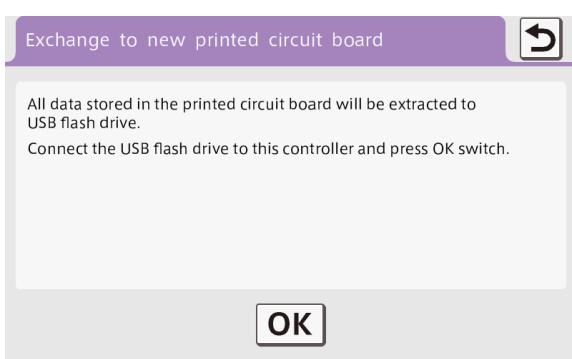
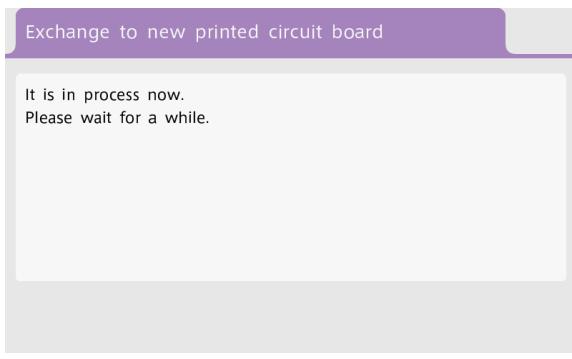
5.13 Service mode 11 (Software update)

<p>■ Start to update</p> <p>In this mode, the software for the main microcomputer and the system image data can be updated. (Software for sub microcomputer cannot be updated).</p> <p>The message is displayed to store software for the main microcomputer and / or a system image in the USB flash drive.</p> <p>If you want to cancel this mode, you can return to the menu screen by touching the return switch on the upper right.</p>	 <p>Update to new software</p> <p>System software and/or system images will be updated.</p> <ol style="list-style-type: none"> 1. Copy the new software and/or the new images into the root directory of USB flash drive. 2. Connect the USB flash drive to this controller and press OK switch. <p>OK</p>
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<p>■ Updating</p> <p>When touching OK switch after connecting the USB flash drive containing updated software, a message of processing is displayed.</p> <p>In case of the system image, only the image data changed or added will be uploaded.</p> <p>The system image data will be uploaded first and software of main microcomputer will be uploaded secondly.</p>	
<p>■ End of updating (in case of image data update only)</p> <p>When the update of the image data ends, an end-message will be displayed. To use continuously, the power must be switched off and on again.</p>	
<p>■ Reset</p> <p>When the software of the main microcomputer is updated, the main microcomputer resets and a start-up screen is displayed.</p>	
<p>■ Version confirmation</p> <p>After the start-up screen is displayed, a message for the version confirmation will be displayed.</p>	

<p>■ Power off</p> <p>When touching OK switch, the message to switch off the power is displayed.</p>	<p>Turn OFF the power switch and turn ON again in order to update the setting.</p>
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5.14 Service mode 12 (Exchange of printed circuit board)

<p>■ Selection</p> <p>In this mode, the back-up data can be transferred to new PCB (printed circuit board) using USB flash drive when exchanging a PCB.</p> <p>At first, choose either of followings.</p> <ul style="list-style-type: none"> · Back-up the data to USB flash drive · Restore the back-up data to new PCB <p>If you want to cancel this mode, you can return to the menu screen by touching the return switch on the upper right.</p>	 <p>Exchange to new printed circuit board</p> <p>Data backup into USB flash drive</p> <p>Data storage to new PC board</p>
<p>■ Data back-up (Start)</p> <p>When touching the switch for the back-up of the data to USB flash drive, the message to instruct to connect USB memory is displayed.</p>	 <p>Exchange to new printed circuit board</p> <p>All data stored in the printed circuit board will be extracted to USB flash drive. Connect the USB flash drive to this controller and press OK switch.</p> <p>OK</p>
<p>■ Data back-up (Processing).</p> <p>When OK switch is touched, the message to indicate processing is displayed.</p>	 <p>Exchange to new printed circuit board</p> <p>It is in process now. Please wait for a while.</p> <p>OK</p>

<p>■ Data back-up (Ending)</p> <p>When the back-up of the data ends, the message to instruct to switch off the power and to exchange to new PCB is displayed.</p>	<p>Exchange to new printed circuit board</p> <p>All data stored in the printed circuit board have been stored in USB flash drive. Turn the power switch off and exchange the printed circuit board.</p>
<p>■ Data transfer to new PCB (Confirmation)</p> <p>After exchanging to new PCB, turn the power switch on again.</p> <p>When touching the switch of “data storage to new PCB”, a caution message is displayed.</p>	<p>Exchange to new printed circuit board</p> <p>Please confirm the data in old printed circuit board had been backup to USB flash drive and old printed circuit board was exchanged to new printed circuit board.</p> <p>OK</p>
<p>■ Data transfer to new PCB (Start)</p> <p>When OK switch is touched, the message to instruct to connect the USB flash drive which has back-up data is displayed.</p>	<p>Exchange to new printed circuit board</p> <p>Backup data in USB flash drive will be written to the new printed circuit board. 1. Confirm the backup data is located in root directory of USB drive. 2. Connect the USB flash drive to this controller and press OK switch.</p> <p>OK</p>
<p>■ Data transfer to new PCB (Processing)</p> <p>When OK switch is touched, the message to instruct to connect USB memory is displayed.</p>	<p>Exchange to new printed circuit board</p> <p>It is in process now. Please wait for a while.</p>
<p>■ Data transfer to new PCB (Ending)</p> <p>When data writing ends, the message to instruct to switch off the power is displayed.</p>	<p>Exchange to new printed circuit board</p> <p>Backup data in USB flash drive has been stored in new PC board. Turn OFF the power switch and turn ON again. Confirm the operations.</p>

5.15 Service mode 13 (Initial setting when installed)

■ Selection

In this mode, the initial settings which must be done when x-ray is installed can be executed.

If you want to cancel this mode, you can return to the menu screen by touching the return switch on the upper right.

Initial setting at new installation

To ensure the correct operation several initial settings are required to be done according to the instructions on the screen.

OK

■ kV adjustment value setting (Confirmation)

Compare the value on the label on the inside of the head yoke with the value on the screen, and change the value on the screen if it is different.

If you want to cancel this mode, you can return to the menu screen by touching the return switch on the upper right.

Tube voltage compensation value (CP)

Confirm the values match the label inside head yoke.
If not, adjust them and touch OK button.

60 kV CP. 7

70 kV CP. 9

OK

■ kV adjustment value setting (Change)

When touching the tube voltage adjustment value to be changed, the color of frame becomes orange and the value can be changed. (The right figure is the example to have chosen the adjustment value of the 60kV setting).

The value increases when touching switch and decreases when touching switch. (0-F) The value changes continuously, if the switch is touched more than one second.

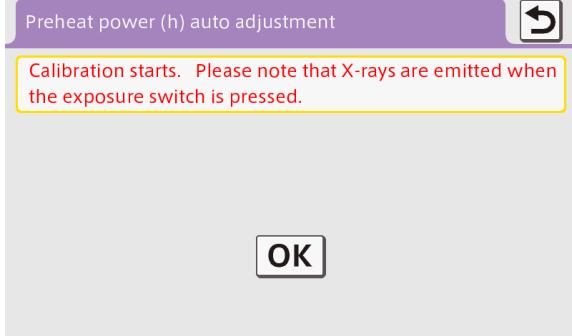
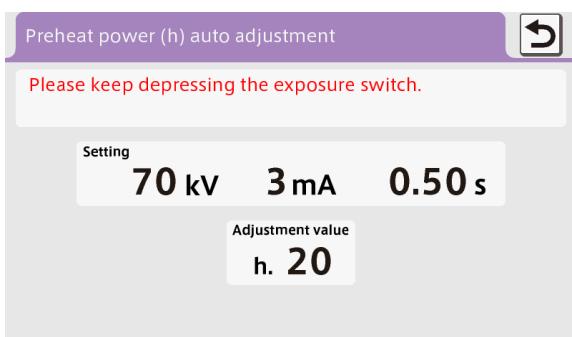
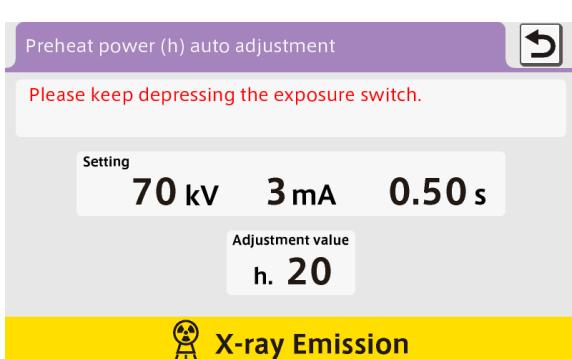
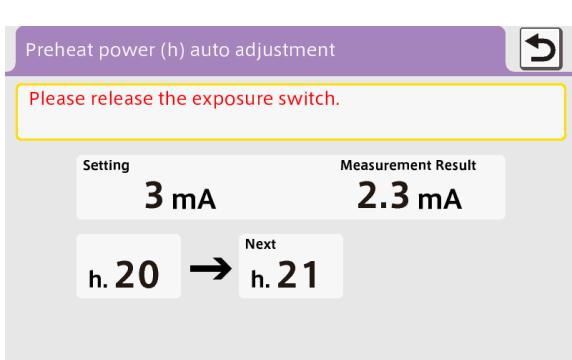
When touching a memory switch, the chime for memory rings and a set value is updated. (By touching this switch after all adjustment values are changed, all the values are stored together.)

Tube voltage compensation value (CP)

60 kV CP. 7

70 kV CP. 9



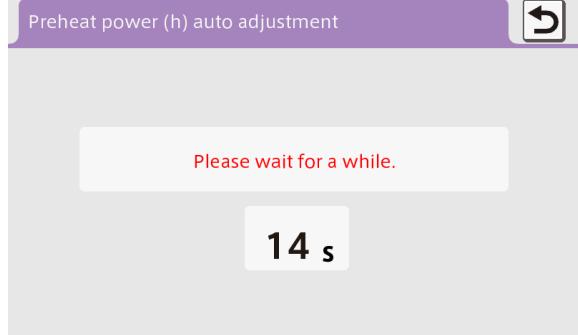
<p>■ Automatic adjustment of the preheating power (Start)</p> <p>When touching a memory switch for the tube voltage adjustment value setting, it switches over to the automatic adjustment mode of the preheating power adjustment value ("h" value) and a starting message is displayed.</p> <p>When touching a return switch in the upper right, it returns to the tube voltage adjustment value setting.</p>	
<p>■ Automatic adjustment of the preheating power (Exposure condition)</p> <p>When OK switch is touched, an exposure conditions are displayed. The exposure time is 0.01 s only for the first exposure.</p>	
<p>■ Automatic adjustment of the preheating power (Making exposure)</p> <p>Keep depressing the exposure switch and the exposure warning is displayed with the sound.</p> <p>If the exposure switch is released during the exposure, the exposure will stop and the error "E.00" is displayed.</p>	
<p>■ Automatic adjustment of the preheating power (The termination of exposure)</p> <p>When the exposure is finished, the message to instruct to let the exposure switch release is displayed.</p>	

- Automatic adjustment of the preheating power
(Waiting for the next exposure)

When the exposure ends and when the adjustment hasn't ended, waiting time for the next exposure is displayed.

When the waiting time becomes 0, it shifts to the exposure beginning screen again.

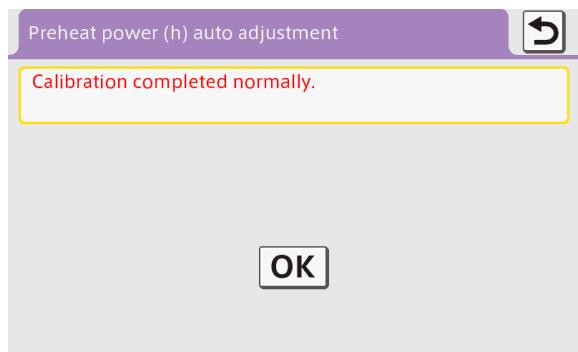
These procedures are repeated until the calibration ends.



- Automatic adjustment of the preheating power
(End of adjustment)

When the adjustment ends, an end-message is displayed.

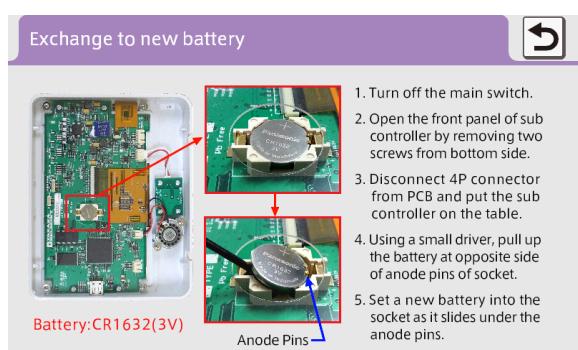
When OK switch is touched, it returns to Menu screen.



5.16 Service mode 14 (Explanation for the battery exchange)

In this mode, the explanation for the battery exchange is displayed.

If you want to cancel this mode, you can return to the menu screen by touching the return switch on the upper right.



6. Exposure time

6.1 Assignable exposure time

0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.13
0.14	0.16	0.18	0.20	0.22	0.25	0.28	0.32	0.36	0.40	0.45	0.50
0.56	0.63	0.71	0.80	0.90	1.00	1.12	1.25	1.40	1.60	1.80	2.00

6.2 Exposure time in the automatic setting mode

Exposure time is calculated by the combination of selections for kV, mA, tooth, patient type, cone and film speed (or digital sensor speed). Exposure time settings for every combination are listed on the tables in the following pages. “**” in the table denotes that a tube current setting is automatically switched to the alternating setting and set at the most appropriate time.

6.2.1 Exposure Time Settings (60kV, 3mA, Short Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
	Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4
F.00	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.11	0.06	0.07	0.08	0.09	0.13
F.01	0.03	0.04	0.05	0.06	0.08	0.06	0.07	0.08	0.09	0.14	0.07	0.08	0.10	0.11	0.16
F.02	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.09	0.10	0.13	0.14	0.20
F.03	0.05	0.06	0.07	0.08	0.13	0.08	0.10	0.13	0.14	0.20	0.11	0.13	0.16	0.18	0.25
F.04	0.07	0.08	0.09	0.11	0.16	0.11	0.13	0.16	0.18	0.25	0.14	0.16	0.20	0.22	0.32
F.05	0.08	0.10	0.11	0.14	0.20	0.14	0.16	0.20	0.22	0.32	0.18	0.20	0.25	0.28	0.40
F.06	0.10	0.13	0.14	0.16	0.25	0.16	0.20	0.25	0.28	0.40	0.22	0.25	0.32	0.36	0.50
F.07	0.13	0.16	0.18	0.20	0.32	0.20	0.25	0.32	0.36	0.50	0.25	0.32	0.36	0.45	0.63
F.08	0.16	0.20	0.22	0.25	0.40	0.28	0.32	0.40	0.45	0.63	0.32	0.40	0.50	0.56	0.80
F.09	0.20	0.25	0.28	0.32	0.50	0.32	0.40	0.50	0.56	0.80	0.40	0.50	0.63	0.71	1.00
F.10	0.25	0.28	0.36	0.40	0.56	0.40	0.50	0.56	0.71	1.00	0.50	0.63	0.71	0.80	1.25
F.11	0.32	0.36	0.45	0.50	0.71	0.50	0.63	0.71	0.90	1.25	0.63	0.80	0.90	1.12	1.60
F.12	0.40	0.45	0.56	0.63	0.90	0.63	0.80	0.90	1.12	1.60	0.80	1.00	1.12	1.40	2.00
F.13	0.50	0.56	0.71	0.80	1.12	0.80	1.00	1.12	1.40	2.00	1.00	1.25	1.40	1.60	*
F.14	0.63	0.71	0.90	1.00	1.40	1.00	1.25	1.40	1.60	*	1.25	1.60	1.80	2.00	*
F.15	0.71	0.90	1.12	1.25	1.80	1.25	1.60	1.80	2.00	*	1.60	1.80	*	*	*
d.00	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.04	0.05	0.03	0.03	0.04	0.05	0.07
d.01	0.02	0.02	0.02	0.03	0.04	0.03	0.03	0.04	0.05	0.07	0.04	0.04	0.05	0.06	0.08
d.02	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.06	0.08	0.04	0.05	0.06	0.07	0.10
d.03	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
d.04	0.03	0.04	0.05	0.05	0.08	0.05	0.07	0.08	0.09	0.13	0.07	0.08	0.10	0.11	0.16
d.05	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.09	0.10	0.13	0.14	0.20
d.06	0.05	0.06	0.07	0.08	0.13	0.08	0.10	0.13	0.14	0.20	0.11	0.13	0.16	0.18	0.25
d.07	0.06	0.08	0.09	0.10	0.16	0.10	0.13	0.16	0.18	0.25	0.13	0.16	0.18	0.22	0.32
d.08	0.08	0.10	0.11	0.13	0.20	0.13	0.16	0.20	0.22	0.32	0.16	0.20	0.25	0.28	0.40
d.09	0.10	0.11	0.14	0.16	0.25	0.16	0.20	0.25	0.28	0.40	0.20	0.25	0.28	0.36	0.50
d.10	0.13	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.32	0.36	0.40	0.63
d.11	0.16	0.18	0.22	0.25	0.36	0.25	0.32	0.36	0.45	0.63	0.32	0.40	0.45	0.56	0.80
d.12	0.20	0.22	0.28	0.32	0.45	0.32	0.40	0.45	0.56	0.80	0.40	0.50	0.56	0.63	1.00
d.13	0.25	0.28	0.36	0.40	0.56	0.40	0.50	0.56	0.63	1.00	0.50	0.63	0.71	0.80	1.25
d.14	0.32	0.36	0.45	0.50	0.71	0.50	0.63	0.71	0.80	1.25	0.63	0.80	0.90	1.00	1.60
d.15	0.36	0.45	0.56	0.63	0.90	0.63	0.80	0.90	1.00	1.60	0.80	0.90	1.12	1.25	1.80

6.2.2 Exposure Time Settings (60kV, 6mA, Short Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
	Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4
F.00	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.04	0.05	0.03	0.03	0.04	0.05	0.07
F.01	0.02	0.02	0.02	0.03	0.04	0.03	0.03	0.04	0.05	0.07	0.04	0.04	0.05	0.06	0.08
F.02	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.06	0.08	0.04	0.05	0.06	0.07	0.10
F.03	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
F.04	0.03	0.04	0.05	0.05	0.08	0.05	0.07	0.08	0.09	0.13	0.07	0.08	0.10	0.11	0.16
F.05	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.09	0.10	0.13	0.14	0.20
F.06	0.05	0.06	0.07	0.08	0.13	0.08	0.10	0.13	0.14	0.20	0.11	0.13	0.16	0.18	0.25
F.07	0.06	0.08	0.09	0.10	0.16	0.10	0.13	0.16	0.18	0.25	0.13	0.16	0.18	0.22	0.32
F.08	0.08	0.10	0.11	0.13	0.20	0.13	0.16	0.20	0.22	0.32	0.16	0.20	0.25	0.28	0.40
F.09	0.10	0.11	0.14	0.16	0.25	0.16	0.20	0.25	0.28	0.40	0.20	0.25	0.28	0.36	0.50
F.10	0.13	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.32	0.36	0.40	0.63
F.11	0.16	0.18	0.22	0.25	0.36	0.25	0.32	0.36	0.45	0.63	0.32	0.40	0.45	0.56	0.80
F.12	0.20	0.22	0.28	0.32	0.45	0.32	0.40	0.45	0.56	0.80	0.40	0.50	0.56	0.63	1.00
F.13	0.25	0.28	0.36	0.40	0.56	0.40	0.50	0.56	0.63	1.00	0.50	0.63	0.71	0.80	1.25
F.14	0.32	0.36	0.45	0.50	0.71	0.50	0.63	0.71	0.80	1.25	0.63	0.80	0.90	1.00	1.60
F.15	0.36	0.45	0.56	0.63	0.90	0.63	0.80	0.90	1.00	1.60	0.80	0.90	1.12	1.25	1.80
d.00	*	*	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.03	0.01	0.02	0.02	0.02	0.03
d.01	*	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.03	0.04
d.02	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.04	0.04	0.02	0.03	0.03	0.04	0.05
d.03	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.03	0.05	0.03	0.03	0.04	0.04	0.06
d.04	0.02	0.02	0.02	0.03	0.04	0.03	0.03	0.04	0.04	0.07	0.03	0.04	0.05	0.06	0.08
d.05	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.06	0.08	0.04	0.05	0.06	0.07	0.10
d.06	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
d.07	0.03	0.04	0.05	0.05	0.08	0.05	0.06	0.08	0.09	0.13	0.07	0.08	0.09	0.11	0.16
d.08	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.08	0.10	0.11	0.14	0.20
d.09	0.05	0.06	0.07	0.08	0.11	0.08	0.10	0.11	0.14	0.20	0.10	0.13	0.14	0.18	0.25
d.10	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.16	0.25	0.13	0.16	0.18	0.22	0.32
d.11	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.22	0.32	0.16	0.20	0.22	0.28	0.40
d.12	0.10	0.11	0.14	0.16	0.22	0.16	0.20	0.22	0.28	0.40	0.20	0.25	0.28	0.32	0.50
d.13	0.13	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.32	0.36	0.40	0.63
d.14	0.16	0.18	0.22	0.25	0.36	0.25	0.32	0.36	0.40	0.63	0.32	0.36	0.45	0.50	0.80
d.15	0.18	0.22	0.28	0.32	0.45	0.32	0.36	0.45	0.50	0.80	0.40	0.45	0.56	0.63	0.90

6.2.3 Exposure Time Settings (70kV, 3mA, Short Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult					
	Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00		0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.05	0.08	0.04	0.05	0.06	0.07	0.10
F.01		0.02	0.03	0.03	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.07	0.08	0.13
F.02		0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.09	0.10	0.14
F.03		0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.08	0.09	0.11	0.13	0.18
F.04		0.05	0.06	0.07	0.08	0.11	0.08	0.09	0.11	0.13	0.18	0.10	0.11	0.14	0.16	0.22
F.05		0.06	0.07	0.08	0.10	0.14	0.10	0.11	0.14	0.16	0.25	0.13	0.14	0.18	0.20	0.28
F.06		0.07	0.09	0.10	0.11	0.18	0.13	0.14	0.18	0.20	0.28	0.16	0.18	0.22	0.25	0.36
F.07		0.09	0.11	0.13	0.14	0.22	0.14	0.18	0.22	0.25	0.36	0.18	0.22	0.28	0.32	0.45
F.08		0.11	0.14	0.16	0.18	0.28	0.18	0.22	0.28	0.32	0.45	0.25	0.28	0.36	0.40	0.56
F.09		0.14	0.16	0.20	0.22	0.36	0.25	0.28	0.36	0.40	0.56	0.28	0.36	0.45	0.50	0.71
F.10		0.18	0.22	0.25	0.28	0.40	0.28	0.36	0.40	0.50	0.71	0.36	0.45	0.50	0.63	0.90
F.11		0.22	0.28	0.32	0.36	0.56	0.36	0.45	0.56	0.63	0.90	0.45	0.56	0.63	0.80	1.12
F.12		0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.80	1.12	0.56	0.71	0.80	1.00	1.40
F.13		0.36	0.40	0.50	0.56	0.80	0.56	0.71	0.80	1.00	1.40	0.71	0.90	1.00	1.25	1.80
F.14		0.45	0.50	0.63	0.71	1.00	0.71	0.90	1.00	1.25	1.80	0.90	1.12	1.25	1.40	*
F.15		0.56	0.63	0.80	0.90	1.25	0.90	1.12	1.25	1.40	*	1.12	1.40	1.60	1.80	*
d.00		0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.04	0.02	0.02	0.03	0.03	0.05	
d.01		0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.03	0.05	0.03	0.03	0.04	0.04	0.06	
d.02		0.01	0.02	0.02	0.02	0.04	0.02	0.03	0.04	0.04	0.06	0.03	0.04	0.04	0.05	0.07
d.03		0.02	0.02	0.03	0.03	0.04	0.03	0.04	0.04	0.05	0.07	0.04	0.05	0.05	0.06	0.09
d.04		0.02	0.03	0.03	0.04	0.06	0.04	0.05	0.06	0.06	0.09	0.05	0.06	0.07	0.08	0.11
d.05		0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.09	0.10	0.14
d.06		0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.08	0.09	0.11	0.13	0.18
d.07		0.04	0.05	0.06	0.07	0.11	0.07	0.09	0.11	0.13	0.18	0.09	0.11	0.13	0.16	0.22
d.08		0.06	0.07	0.08	0.09	0.14	0.09	0.11	0.14	0.16	0.22	0.11	0.14	0.18	0.20	0.28
d.09		0.07	0.08	0.10	0.11	0.18	0.11	0.14	0.18	0.20	0.28	0.14	0.18	0.22	0.25	0.36
d.10		0.09	0.11	0.13	0.14	0.22	0.14	0.18	0.22	0.25	0.36	0.18	0.22	0.25	0.32	0.45
d.11		0.11	0.13	0.16	0.18	0.28	0.18	0.22	0.28	0.32	0.45	0.22	0.28	0.32	0.40	0.56
d.12		0.14	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.40	0.56	0.28	0.36	0.40	0.50	0.71
d.13		0.18	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.50	0.71	0.36	0.45	0.50	0.63	0.90
d.14		0.22	0.25	0.32	0.36	0.50	0.36	0.45	0.50	0.63	0.90	0.45	0.56	0.63	0.71	1.12
d.15		0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.71	1.12	0.56	0.71	0.80	0.90	1.40

6.2.4 Exposure Time Settings (70kV, 6mA, Short Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult					
	Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00		0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.04	0.02	0.02	0.03	0.03	0.05	
F.01		0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.03	0.05	0.03	0.03	0.04	0.04	0.06	
F.02		0.01	0.02	0.02	0.02	0.04	0.02	0.03	0.04	0.04	0.06	0.03	0.04	0.04	0.05	0.07
F.03		0.02	0.02	0.03	0.03	0.04	0.03	0.04	0.04	0.05	0.07	0.04	0.05	0.05	0.06	0.09
F.04		0.02	0.03	0.03	0.04	0.06	0.04	0.05	0.06	0.06	0.09	0.05	0.06	0.07	0.08	0.11
F.05		0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.09	0.10	0.14
F.06		0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.08	0.09	0.11	0.13	0.18
F.07		0.04	0.05	0.06	0.07	0.11	0.07	0.09	0.11	0.13	0.18	0.09	0.11	0.13	0.16	0.22
F.08		0.06	0.07	0.08	0.09	0.14	0.09	0.11	0.14	0.16	0.22	0.11	0.14	0.18	0.20	0.28
F.09		0.07	0.08	0.10	0.11	0.18	0.11	0.14	0.18	0.20	0.28	0.14	0.18	0.22	0.25	0.36
F.10		0.09	0.11	0.13	0.14	0.22	0.14	0.18	0.22	0.25	0.36	0.18	0.22	0.25	0.32	0.45
F.11		0.11	0.13	0.16	0.18	0.28	0.18	0.22	0.28	0.32	0.45	0.22	0.28	0.32	0.40	0.56
F.12		0.14	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.40	0.56	0.28	0.36	0.40	0.50	0.71
F.13		0.18	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.50	0.71	0.36	0.45	0.50	0.63	0.90
F.14		0.22	0.25	0.32	0.36	0.50	0.36	0.45	0.50	0.63	0.90	0.45	0.56	0.63	0.71	1.12
F.15		0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.71	1.12	0.56	0.71	0.80	0.90	1.40
d.00		*	*	*	*	0.01	*	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02	
d.01		*	*	*	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.03	
d.02		*	*	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.02	0.03	0.04
d.03		0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.04	0.04	0.02	0.02	0.03	0.03	0.05
d.04		0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.03	0.03	0.05	0.02	0.03	0.04	0.04	0.06
d.05		0.01	0.02	0.02	0.02	0.04	0.02	0.03	0.04	0.04	0.06	0.03	0.04	0.04	0.05	0.07
d.06		0.02	0.02	0.03	0.03	0.04	0.03	0.04	0.04	0.05	0.07	0.04	0.05	0.05	0.06	0.09
d.07		0.02	0.03	0.03	0.04	0.05	0.04	0.04	0.05	0.06	0.09	0.05	0.06	0.07	0.08	0.11
d.08		0.03	0.03	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.09	0.10	0.14
d.09		0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.07	0.09	0.11	0.13	0.18
d.10		0.04	0.05	0.06	0.07	0.11	0.07	0.09	0.11	0.13	0.18	0.09	0.11	0.13	0.16	0.22
d.11		0.06	0.07	0.08	0.09	0.13	0.09	0.11	0.13	0.16	0.22	0.11	0.14	0.16	0.20	0.28
d.12		0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.20	0.28	0.14	0.18	0.20	0.25	0.36
d.13		0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
d.14		0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
d.15		0.13	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.32	0.40	0.45	0.71

6.2.5 Exposure Time Settings (60kV, 3mA, Long Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.06	0.07	0.08	0.09	0.13	0.09	0.11	0.13	0.16	0.22	0.11	0.14	0.16	0.20	0.28
F.01	0.07	0.08	0.10	0.11	0.18	0.11	0.14	0.18	0.20	0.28	0.14	0.18	0.22	0.25	0.36
F.02	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
F.03	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
F.04	0.14	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.36	0.40	0.45	0.71
F.05	0.18	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.45	0.71	0.36	0.45	0.50	0.56	0.90
F.06	0.22	0.25	0.32	0.36	0.50	0.36	0.40	0.50	0.56	0.90	0.45	0.56	0.63	0.71	1.12
F.07	0.25	0.32	0.36	0.45	0.63	0.45	0.50	0.63	0.71	1.00	0.56	0.63	0.80	0.90	1.25
F.08	0.32	0.40	0.50	0.56	0.80	0.56	0.63	0.80	0.90	1.40	0.71	0.80	1.00	1.12	1.60
F.09	0.40	0.50	0.63	0.71	1.00	0.71	0.80	1.00	1.12	1.60	0.90	1.00	1.25	1.40	2.00
F.10	0.50	0.63	0.71	0.90	1.25	0.90	1.00	1.25	1.40	2.00	1.12	1.25	1.60	1.80	*
F.11	0.63	0.80	0.90	1.12	1.60	1.12	1.25	1.60	1.80	*	1.40	1.60	2.00	*	*
F.12	0.80	1.00	1.12	1.40	2.00	1.40	1.60	2.00	*	*	1.60	2.00	*	*	*
F.13	1.00	1.25	1.40	1.60	*	1.60	2.00	*	*	*	2.00	*	*	*	*
F.14	1.25	1.60	1.80	2.00	*	2.00	*	*	*	*	*	*	*	*	*
F.15	1.60	1.80	*	*	*	*	*	*	*	*	*	*	*	*	*
d.00	0.03	0.03	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.08	0.10	0.14
d.01	0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.07	0.09	0.11	0.13	0.18
d.02	0.04	0.05	0.06	0.07	0.10	0.07	0.09	0.10	0.11	0.18	0.09	0.11	0.13	0.14	0.22
d.03	0.05	0.06	0.08	0.09	0.13	0.09	0.11	0.13	0.14	0.22	0.11	0.13	0.16	0.18	0.28
d.04	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.18	0.28	0.14	0.18	0.20	0.25	0.36
d.05	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
d.06	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
d.07	0.13	0.16	0.18	0.22	0.32	0.22	0.25	0.32	0.36	0.50	0.28	0.32	0.40	0.45	0.63
d.08	0.16	0.20	0.25	0.28	0.40	0.28	0.32	0.40	0.45	0.63	0.36	0.40	0.50	0.56	0.80
d.09	0.20	0.25	0.28	0.36	0.50	0.36	0.40	0.50	0.56	0.80	0.45	0.50	0.63	0.71	1.00
d.10	0.25	0.32	0.36	0.45	0.63	0.45	0.50	0.63	0.71	1.00	0.56	0.63	0.80	0.90	1.25
d.11	0.32	0.40	0.45	0.56	0.80	0.56	0.63	0.80	0.90	1.25	0.71	0.80	1.00	1.12	1.60
d.12	0.40	0.50	0.56	0.63	1.00	0.71	0.80	1.00	1.12	1.60	0.80	1.00	1.25	1.40	2.00
d.13	0.50	0.63	0.71	0.80	1.25	0.80	1.00	1.25	1.40	2.00	1.00	1.25	1.60	1.80	*
d.14	0.63	0.80	0.90	1.00	1.60	1.00	1.25	1.60	1.80	*	1.25	1.60	1.80	*	*
d.15	0.80	0.90	1.12	1.25	2.00	1.25	1.60	2.00	2.00	2.00	1.60	2.00	2.00	2.00	2.00

6.2.6 Exposure Time Settings (60kV, 6mA, Long Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.03	0.03	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.08	0.10	0.14
F.01	0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.07	0.09	0.11	0.13	0.18
F.02	0.04	0.05	0.06	0.07	0.10	0.07	0.09	0.10	0.11	0.18	0.09	0.11	0.13	0.14	0.22
F.03	0.05	0.06	0.08	0.09	0.13	0.09	0.11	0.13	0.14	0.22	0.11	0.13	0.16	0.18	0.28
F.04	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.18	0.28	0.14	0.18	0.20	0.25	0.36
F.05	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
F.06	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
F.07	0.13	0.16	0.18	0.22	0.32	0.22	0.25	0.32	0.36	0.50	0.28	0.32	0.40	0.45	0.63
F.08	0.16	0.20	0.25	0.28	0.40	0.28	0.32	0.40	0.45	0.63	0.36	0.40	0.50	0.56	0.80
F.09	0.20	0.25	0.28	0.36	0.50	0.36	0.40	0.50	0.56	0.80	0.45	0.50	0.63	0.71	1.00
F.10	0.25	0.32	0.36	0.45	0.63	0.45	0.50	0.63	0.71	1.00	0.56	0.63	0.80	0.90	1.25
F.11	0.32	0.40	0.45	0.56	0.80	0.56	0.63	0.80	0.90	1.25	0.71	0.80	1.00	1.12	1.60
F.12	0.40	0.50	0.56	0.63	1.00	0.71	0.80	1.00	1.12	1.60	0.80	1.00	1.25	1.40	2.00
F.13	0.50	0.63	0.71	0.80	1.25	0.80	1.00	1.25	1.40	2.00	1.00	1.25	1.60	1.80	2.00
F.14	0.63	0.80	0.90	1.00	1.60	1.00	1.25	1.60	1.80	2.00	1.25	1.60	1.80	2.00	2.00
F.15	0.80	0.90	1.12	1.25	2.00	1.25	1.60	2.00	2.00	2.00	1.60	2.00	2.00	2.00	2.00
d.00	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.04	0.06	0.03	0.03	0.04	0.05	0.07
d.01	0.02	0.02	0.03	0.03	0.04	0.03	0.04	0.04	0.05	0.07	0.04	0.04	0.05	0.06	0.09
d.02	0.02	0.03	0.03	0.04	0.05	0.04	0.04	0.05	0.06	0.09	0.04	0.05	0.06	0.07	0.11
d.03	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.11	0.06	0.07	0.08	0.09	0.13
d.04	0.03	0.04	0.05	0.06	0.08	0.06	0.07	0.08	0.09	0.14	0.07	0.09	0.10	0.11	0.18
d.05	0.04	0.05	0.06	0.07	0.10	0.07	0.09	0.10	0.11	0.18	0.09	0.11	0.13	0.14	0.22
d.06	0.05	0.06	0.08	0.09	0.13	0.09	0.11	0.13	0.14	0.22	0.11	0.13	0.16	0.18	0.28
d.07	0.07	0.08	0.09	0.11	0.16	0.11	0.13	0.16	0.18	0.25	0.14	0.16	0.20	0.22	0.32
d.08	0.08	0.10	0.13	0.14	0.20	0.14	0.16	0.20	0.22	0.32	0.18	0.20	0.25	0.28	0.40
d.09	0.10	0.13	0.14	0.18	0.25	0.18	0.20	0.25	0.28	0.40	0.22	0.25	0.32	0.36	0.50
d.10	0.13	0.16	0.18	0.22	0.32	0.22	0.25	0.32	0.36	0.50	0.28	0.32	0.40	0.45	0.63
d.11	0.16	0.20	0.22	0.28	0.40	0.28	0.32	0.40	0.45	0.63	0.32	0.40	0.50	0.56	0.80
d.12	0.20	0.25	0.28	0.32	0.50	0.32	0.40	0.50	0.56	0.80	0.40	0.50	0.63	0.71	1.00
d.13	0.25	0.32	0.36	0.40	0.63	0.40	0.50	0.63	0.71	1.00	0.50	0.63	0.80	0.90	1.25
d.14	0.32	0.36	0.45	0.50	0.80	0.50	0.63	0.80	0.90	1.25	0.63	0.80	0.90	1.12	1.60
d.15	0.40	0.45	0.56	0.63	1.00	0.63	0.80	1.00	1.12	1.60	0.80	1.00	1.25	1.40	2.00

6.2.7 Exposure Time Settings (70kV, 3mA, Long Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
	Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4
F.00	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.08	0.10	0.11	0.14	0.20
F.01	0.05	0.06	0.07	0.08	0.13	0.08	0.10	0.13	0.14	0.20	0.10	0.13	0.16	0.18	0.25
F.02	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.16	0.25	0.13	0.16	0.18	0.22	0.32
F.03	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.20	0.32	0.16	0.18	0.22	0.25	0.40
F.04	0.10	0.11	0.14	0.16	0.22	0.16	0.20	0.22	0.28	0.40	0.20	0.25	0.28	0.32	0.50
F.05	0.13	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.32	0.36	0.40	0.63
F.06	0.16	0.18	0.22	0.25	0.36	0.25	0.32	0.36	0.40	0.63	0.32	0.36	0.45	0.50	0.80
F.07	0.18	0.22	0.28	0.32	0.45	0.32	0.36	0.45	0.50	0.71	0.40	0.45	0.56	0.63	0.90
F.08	0.25	0.28	0.36	0.40	0.56	0.40	0.50	0.56	0.63	1.00	0.50	0.63	0.71	0.80	1.25
F.09	0.28	0.36	0.45	0.50	0.71	0.50	0.56	0.71	0.80	1.25	0.63	0.71	0.90	1.00	1.40
F.10	0.36	0.45	0.56	0.63	0.90	0.63	0.71	0.90	1.00	1.40	0.80	0.90	1.12	1.25	1.80
F.11	0.45	0.56	0.63	0.80	1.12	0.80	0.90	1.12	1.25	1.80	1.00	1.12	1.40	1.60	*
F.12	0.56	0.71	0.80	1.00	1.40	1.00	1.12	1.40	1.60	*	1.25	1.40	1.80	2.00	*
F.13	0.71	0.90	1.00	1.25	1.80	1.25	1.40	1.80	2.00	*	1.40	1.80	*	*	*
F.14	0.90	1.12	1.25	1.40	*	1.40	1.80	*	*	*	1.80	*	*	*	*
F.15	1.12	1.40	1.60	1.80	*	1.80	*	*	*	*	*	*	*	*	*
d.00	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.05	0.08	0.04	0.05	0.06	0.07	0.10
d.01	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
d.02	0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.13	0.06	0.08	0.09	0.11	0.16
d.03	0.04	0.05	0.05	0.06	0.09	0.06	0.08	0.09	0.10	0.16	0.08	0.09	0.11	0.13	0.20
d.04	0.05	0.06	0.07	0.08	0.11	0.08	0.10	0.11	0.13	0.20	0.10	0.13	0.14	0.16	0.25
d.05	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.16	0.25	0.13	0.16	0.18	0.22	0.32
d.06	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.20	0.32	0.16	0.18	0.22	0.25	0.40
d.07	0.09	0.11	0.14	0.16	0.22	0.16	0.18	0.22	0.25	0.36	0.20	0.22	0.28	0.32	0.45
d.08	0.11	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.28	0.36	0.40	0.63
d.09	0.14	0.18	0.22	0.25	0.36	0.25	0.28	0.36	0.40	0.56	0.32	0.36	0.45	0.50	0.71
d.10	0.18	0.22	0.28	0.32	0.45	0.32	0.36	0.45	0.50	0.71	0.40	0.45	0.56	0.63	0.90
d.11	0.22	0.28	0.32	0.40	0.56	0.40	0.45	0.56	0.63	0.90	0.50	0.56	0.71	0.80	1.12
d.12	0.28	0.36	0.40	0.50	0.71	0.50	0.56	0.71	0.80	1.12	0.63	0.71	0.90	1.00	1.40
d.13	0.36	0.45	0.50	0.63	0.90	0.63	0.71	0.90	1.00	1.40	0.71	0.90	1.12	1.25	1.80
d.14	0.45	0.56	0.63	0.71	1.12	0.71	0.90	1.12	1.25	1.80	0.90	1.12	1.40	1.60	*
d.15	0.56	0.71	0.80	0.90	1.40	0.90	1.12	1.40	1.60	*	1.12	1.40	1.60	2.00	*

6.2.8 Exposure Time Settings (70kV, 6mA, Long Cone)

[unit : sec.]

Patient	Child					Adult					Large Adult				
	Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4
F.00	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.05	0.08	0.04	0.05	0.06	0.07	0.10
F.01	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
F.02	0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.13	0.06	0.08	0.09	0.11	0.16
F.03	0.04	0.05	0.05	0.06	0.09	0.06	0.08	0.09	0.10	0.16	0.08	0.09	0.11	0.13	0.20
F.04	0.05	0.06	0.07	0.08	0.11	0.08	0.10	0.11	0.13	0.20	0.10	0.13	0.14	0.16	0.25
F.05	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.16	0.25	0.13	0.16	0.18	0.22	0.32
F.06	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.20	0.32	0.16	0.18	0.22	0.25	0.40
F.07	0.09	0.11	0.14	0.16	0.22	0.16	0.18	0.22	0.25	0.36	0.20	0.22	0.28	0.32	0.45
F.08	0.11	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.28	0.36	0.40	0.63
F.09	0.14	0.18	0.22	0.25	0.36	0.25	0.28	0.36	0.40	0.56	0.32	0.36	0.45	0.50	0.71
F.10	0.18	0.22	0.28	0.32	0.45	0.32	0.36	0.45	0.50	0.71	0.40	0.45	0.56	0.63	0.90
F.11	0.22	0.28	0.32	0.40	0.56	0.40	0.45	0.56	0.63	0.90	0.50	0.56	0.71	0.80	1.12
F.12	0.28	0.36	0.40	0.50	0.71	0.50	0.56	0.71	0.80	1.12	0.63	0.71	0.90	1.00	1.40
F.13	0.36	0.45	0.50	0.63	0.90	0.63	0.71	0.90	1.00	1.40	0.71	0.90	1.12	1.25	1.80
F.14	0.45	0.56	0.63	0.71	1.12	0.71	0.90	1.12	1.25	1.80	0.90	1.12	1.40	1.60	2.00
F.15	0.56	0.71	0.80	0.90	1.40	0.90	1.12	1.40	1.60	2.00	1.12	1.40	1.60	2.00	2.00
d.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.04	0.04	0.02	0.02	0.03	0.03	0.05
d.01	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.05	0.05	0.03	0.03	0.04	0.04	0.06
d.02	0.02	0.02	0.02	0.03	0.04	0.03	0.03	0.04	0.04	0.06	0.03	0.04	0.05	0.05	0.08
d.03	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.05	0.08	0.04	0.05	0.06	0.07	0.10
d.04	0.02	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.07	0.08	0.13
d.05	0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.13	0.06	0.08	0.09	0.11	0.16
d.06	0.04	0.05	0.05	0.06	0.09	0.06	0.08	0.09	0.10	0.16	0.08	0.09	0.11	0.13	0.20
d.07	0.05	0.06	0.07	0.08	0.11	0.08	0.09	0.11	0.13	0.18	0.10	0.11	0.14	0.16	0.25
d.08	0.06	0.07	0.09	0.10	0.14	0.10	0.11	0.14	0.16	0.25	0.13	0.14	0.18	0.20	0.28
d.09	0.07	0.09	0.11	0.13	0.18	0.13	0.14	0.18	0.20	0.28	0.16	0.18	0.22	0.25	0.36
d.10	0.09	0.11	0.13	0.16	0.22	0.16	0.18	0.22	0.25	0.36	0.20	0.22	0.28	0.32	0.45
d.11	0.11	0.14	0.16	0.20	0.28	0.20	0.22	0.28	0.32	0.45	0.25	0.28	0.36	0.40	0.56
d.12	0.14	0.18	0.20	0.25	0.36	0.25	0.28	0.36	0.40	0.56	0.28	0.36	0.45	0.50	0.71
d.13	0.18	0.22	0.25	0.28	0.45	0.28	0.36	0.45	0.50	0.71	0.36	0.45	0.56	0.63	0.90
d.14	0.22	0.28	0.32	0.36	0.56	0.36	0.45	0.56	0.63	0.90	0.45	0.56	0.71	0.80	1.12
d.15	0.28	0.32	0.40	0.45	0.71	0.45	0.56	0.71	0.80	1.12	0.56	0.71	0.80	1.00	1.40

6.2.9 Exposure Time Settings (60kV, 3mA, Short Cone + Rectangular Collimator)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.04	0.04	0.05	0.06	0.09	0.06	0.07	0.09	0.10	0.14	0.08	0.09	0.11	0.13	0.18
F.01	0.05	0.06	0.07	0.08	0.11	0.08	0.09	0.11	0.13	0.18	0.10	0.11	0.14	0.16	0.22
F.02	0.06	0.07	0.08	0.09	0.14	0.09	0.11	0.14	0.16	0.22	0.11	0.14	0.18	0.20	0.28
F.03	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.20	0.28	0.14	0.18	0.22	0.25	0.36
F.04	0.09	0.11	0.13	0.14	0.22	0.14	0.18	0.22	0.25	0.36	0.18	0.22	0.28	0.32	0.45
F.05	0.11	0.14	0.16	0.18	0.28	0.18	0.22	0.28	0.32	0.45	0.25	0.28	0.36	0.40	0.56
F.06	0.14	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.40	0.56	0.28	0.36	0.40	0.50	0.71
F.07	0.18	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.50	0.71	0.36	0.45	0.50	0.63	0.90
F.08	0.22	0.25	0.32	0.36	0.56	0.36	0.45	0.50	0.63	0.90	0.45	0.56	0.63	0.80	1.12
F.09	0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.71	1.12	0.56	0.71	0.80	0.90	1.40
F.10	0.32	0.40	0.50	0.56	0.80	0.56	0.71	0.80	0.90	1.40	0.71	0.90	1.00	1.12	1.80
F.11	0.45	0.50	0.63	0.71	1.00	0.71	0.90	1.00	1.12	1.80	0.90	1.12	1.25	1.40	*
F.12	0.56	0.63	0.80	0.90	1.25	0.90	1.12	1.25	1.40	*	1.12	1.40	1.60	1.80	*
F.13	0.63	0.80	1.00	1.12	1.60	1.12	1.40	1.60	1.80	*	1.40	1.60	2.00	*	*
F.14	0.80	1.00	1.25	1.40	2.00	1.40	1.60	2.00	*	*	1.80	2.00	*	*	*
F.15	1.00	1.25	1.60	1.80	*	1.80	2.00	*	*	*	*	*	*	*	*
d.00	0.02	0.02	0.03	0.03	0.04	0.03	0.04	0.04	0.05	0.07	0.04	0.05	0.06	0.06	0.09
d.01	0.02	0.03	0.03	0.04	0.06	0.04	0.05	0.06	0.06	0.09	0.05	0.06	0.07	0.08	0.11
d.02	0.03	0.03	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.09	0.10	0.14
d.03	0.03	0.04	0.05	0.06	0.08	0.06	0.07	0.08	0.10	0.14	0.07	0.09	0.11	0.13	0.18
d.04	0.04	0.05	0.06	0.07	0.11	0.07	0.09	0.11	0.13	0.18	0.09	0.11	0.14	0.16	0.22
d.05	0.06	0.07	0.08	0.09	0.14	0.09	0.11	0.14	0.16	0.22	0.11	0.14	0.18	0.20	0.28
d.06	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.20	0.28	0.14	0.18	0.22	0.25	0.36
d.07	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
d.08	0.11	0.13	0.16	0.18	0.28	0.18	0.22	0.25	0.32	0.45	0.22	0.28	0.32	0.36	0.56
d.09	0.14	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.36	0.40	0.45	0.71
d.10	0.16	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.45	0.71	0.36	0.45	0.50	0.56	0.90
d.11	0.22	0.25	0.32	0.36	0.50	0.36	0.45	0.50	0.56	0.90	0.45	0.56	0.63	0.71	1.12
d.12	0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.71	1.12	0.56	0.63	0.80	0.90	1.40
d.13	0.32	0.40	0.50	0.56	0.80	0.56	0.63	0.80	0.90	1.40	0.71	0.80	1.00	1.12	1.60
d.14	0.40	0.50	0.63	0.71	1.00	0.71	0.80	1.00	1.12	1.60	0.90	1.00	1.25	1.40	2.00
d.15	0.50	0.63	0.71	0.90	1.25	0.90	1.00	1.25	1.40	2.00	1.12	1.25	1.60	1.80	*

6.2.10 Exposure Time Settings (60kV, 6mA, Short Cone + Rectangular Collimator)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.02	0.02	0.03	0.03	0.04	0.03	0.04	0.04	0.05	0.07	0.04	0.05	0.06	0.06	0.09
F.01	0.02	0.03	0.03	0.04	0.06	0.04	0.05	0.06	0.06	0.09	0.05	0.06	0.07	0.08	0.11
F.02	0.03	0.03	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.09	0.10	0.14
F.03	0.03	0.04	0.05	0.06	0.08	0.06	0.07	0.08	0.10	0.14	0.07	0.09	0.11	0.13	0.18
F.04	0.04	0.05	0.06	0.07	0.11	0.07	0.09	0.11	0.13	0.18	0.09	0.11	0.14	0.16	0.22
F.05	0.06	0.07	0.08	0.09	0.14	0.09	0.11	0.14	0.16	0.22	0.11	0.14	0.18	0.20	0.28
F.06	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.20	0.28	0.14	0.18	0.22	0.25	0.36
F.07	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
F.08	0.11	0.13	0.16	0.18	0.28	0.18	0.22	0.25	0.32	0.45	0.22	0.28	0.32	0.36	0.56
F.09	0.14	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.36	0.40	0.45	0.71
F.10	0.16	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.45	0.71	0.36	0.45	0.50	0.56	0.90
F.11	0.22	0.25	0.32	0.36	0.50	0.36	0.45	0.50	0.56	0.90	0.45	0.56	0.63	0.71	1.12
F.12	0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.71	1.12	0.56	0.63	0.80	0.90	1.40
F.13	0.32	0.40	0.50	0.56	0.80	0.56	0.63	0.80	0.90	1.40	0.71	0.80	1.00	1.12	1.60
F.14	0.40	0.50	0.63	0.71	1.00	0.71	0.80	1.00	1.12	1.60	0.90	1.00	1.25	1.40	2.00
F.15	0.50	0.63	0.71	0.90	1.25	0.90	1.00	1.25	1.40	2.00	1.12	1.25	1.60	1.80	2.00
d.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.04	0.07	0.02	0.02	0.03	0.03	0.05
d.01	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.03	0.05	0.07	0.02	0.03	0.04	0.04	0.06
d.02	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.04	0.06	0.03	0.04	0.04	0.05	0.07
d.03	0.02	0.02	0.03	0.03	0.04	0.03	0.04	0.04	0.05	0.07	0.04	0.04	0.05	0.06	0.09
d.04	0.02	0.03	0.03	0.04	0.05	0.04	0.05	0.05	0.06	0.09	0.05	0.06	0.07	0.08	0.11
d.05	0.03	0.03	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.11	0.06	0.07	0.09	0.10	0.14
d.06	0.03	0.04	0.05	0.06	0.08	0.06	0.07	0.08	0.10	0.14	0.07	0.09	0.11	0.13	0.18
d.07	0.04	0.05	0.06	0.07	0.10	0.07	0.09	0.10	0.11	0.18	0.09	0.11	0.13	0.14	0.22
d.08	0.05	0.07	0.08	0.09	0.13	0.09	0.11	0.13	0.16	0.22	0.11	0.14	0.16	0.18	0.28
d.09	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.18	0.28	0.14	0.18	0.20	0.25	0.36
d.10	0.08	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.22	0.36	0.18	0.22	0.25	0.28	0.45
d.11	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
d.12	0.13	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.32	0.40	0.45	0.63
d.13	0.16	0.20	0.25	0.28	0.40	0.28	0.32	0.40	0.45	0.63	0.36	0.40	0.50	0.56	0.80
d.14	0.20	0.25	0.32	0.36	0.50	0.36	0.40	0.50	0.56	0.80	0.45	0.50	0.63	0.71	1.00
d.15	0.25	0.32	0.36	0.45	0.63	0.45	0.50	0.63	0.71	1.00	0.56	0.63	0.80	0.90	1.25

6.2.11 Exposure Time Settings (70kV, 3mA, Short Cone + Rectangular Collimator)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.03	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.11	0.05	0.07	0.08	0.09	0.13
F.01	0.03	0.04	0.05	0.06	0.08	0.06	0.07	0.08	0.09	0.13	0.07	0.08	0.10	0.11	0.16
F.02	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.08	0.10	0.13	0.14	0.20
F.03	0.05	0.06	0.07	0.08	0.13	0.08	0.10	0.13	0.14	0.20	0.10	0.13	0.16	0.18	0.25
F.04	0.06	0.08	0.09	0.11	0.16	0.11	0.13	0.16	0.18	0.25	0.13	0.16	0.20	0.22	0.32
F.05	0.08	0.10	0.11	0.13	0.20	0.13	0.16	0.20	0.22	0.32	0.16	0.20	0.25	0.28	0.40
F.06	0.10	0.13	0.14	0.16	0.25	0.16	0.20	0.25	0.28	0.40	0.20	0.25	0.32	0.36	0.50
F.07	0.13	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.36	0.50	0.25	0.32	0.36	0.45	0.63
F.08	0.16	0.18	0.22	0.25	0.36	0.25	0.32	0.36	0.45	0.63	0.32	0.40	0.45	0.56	0.80
F.09	0.20	0.22	0.28	0.32	0.45	0.32	0.40	0.45	0.56	0.80	0.40	0.50	0.56	0.71	1.00
F.10	0.25	0.28	0.36	0.40	0.56	0.40	0.50	0.56	0.71	1.00	0.50	0.63	0.71	0.80	1.25
F.11	0.32	0.36	0.45	0.50	0.71	0.50	0.63	0.71	0.80	1.25	0.63	0.80	0.90	1.00	1.60
F.12	0.40	0.45	0.56	0.63	0.90	0.63	0.80	0.90	1.00	1.60	0.80	1.00	1.12	1.25	2.00
F.13	0.50	0.56	0.71	0.80	1.12	0.80	1.00	1.12	1.25	2.00	1.00	1.25	1.40	1.60	*
F.14	0.56	0.71	0.90	1.00	1.40	1.00	1.25	1.40	1.60	*	1.25	1.40	1.80	2.00	*
F.15	0.71	0.90	1.12	1.25	1.80	1.25	1.40	1.80	2.00	*	1.60	1.80	*	*	*
d.00	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.04	0.05	0.03	0.03	0.04	0.05	0.07
d.01	0.02	0.02	0.02	0.03	0.04	0.03	0.03	0.04	0.05	0.07	0.03	0.04	0.05	0.06	0.08
d.02	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.06	0.08	0.04	0.05	0.06	0.07	0.10
d.03	0.02	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
d.04	0.03	0.04	0.05	0.05	0.08	0.05	0.06	0.08	0.09	0.13	0.07	0.08	0.10	0.11	0.16
d.05	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.08	0.10	0.13	0.14	0.20
d.06	0.05	0.06	0.07	0.08	0.13	0.08	0.10	0.13	0.14	0.20	0.10	0.13	0.16	0.18	0.25
d.07	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.18	0.25	0.13	0.16	0.18	0.22	0.32
d.08	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.22	0.32	0.16	0.20	0.25	0.28	0.40
d.09	0.10	0.11	0.14	0.16	0.25	0.16	0.20	0.22	0.28	0.40	0.20	0.25	0.28	0.32	0.50
d.10	0.13	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.32	0.36	0.40	0.63
d.11	0.16	0.18	0.22	0.25	0.36	0.25	0.32	0.36	0.40	0.63	0.32	0.40	0.45	0.50	0.80
d.12	0.20	0.22	0.28	0.32	0.45	0.32	0.40	0.45	0.50	0.80	0.40	0.50	0.56	0.63	1.00
d.13	0.25	0.28	0.36	0.40	0.56	0.40	0.50	0.56	0.63	1.00	0.50	0.63	0.71	0.80	1.25
d.14	0.28	0.36	0.45	0.50	0.71	0.50	0.63	0.71	0.80	1.25	0.63	0.71	0.90	1.00	1.40
d.15	0.36	0.45	0.56	0.63	0.90	0.63	0.71	0.90	1.00	1.40	0.80	0.90	1.12	1.25	1.80

6.2.12 Exposure Time Settings (70kV, 6mA, Short Cone + Rectangular Collimator)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.04	0.05	0.03	0.03	0.04	0.05	0.07
F.01	0.02	0.02	0.02	0.03	0.04	0.03	0.03	0.04	0.05	0.07	0.03	0.04	0.05	0.06	0.08
F.02	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.06	0.08	0.04	0.05	0.06	0.07	0.10
F.03	0.02	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
F.04	0.03	0.04	0.05	0.05	0.08	0.05	0.06	0.08	0.09	0.13	0.07	0.08	0.10	0.11	0.16
F.05	0.04	0.05	0.06	0.07	0.10	0.07	0.08	0.10	0.11	0.16	0.08	0.10	0.13	0.14	0.20
F.06	0.05	0.06	0.07	0.08	0.13	0.08	0.10	0.13	0.14	0.20	0.10	0.13	0.16	0.18	0.25
F.07	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.18	0.25	0.13	0.16	0.18	0.22	0.32
F.08	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.22	0.32	0.16	0.20	0.25	0.28	0.40
F.09	0.10	0.11	0.14	0.16	0.25	0.16	0.20	0.22	0.28	0.40	0.20	0.25	0.28	0.32	0.50
F.10	0.13	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.32	0.36	0.40	0.63
F.11	0.16	0.18	0.22	0.25	0.36	0.25	0.32	0.36	0.40	0.63	0.32	0.40	0.45	0.50	0.80
F.12	0.20	0.22	0.28	0.32	0.45	0.32	0.40	0.45	0.50	0.80	0.40	0.50	0.56	0.63	1.00
F.13	0.25	0.28	0.36	0.40	0.56	0.40	0.50	0.56	0.63	1.00	0.50	0.63	0.71	0.80	1.25
F.14	0.28	0.36	0.45	0.50	0.71	0.50	0.63	0.71	0.80	1.25	0.63	0.71	0.90	1.00	1.40
F.15	0.36	0.45	0.56	0.63	0.90	0.63	0.71	0.90	1.00	1.40	0.80	0.90	1.12	1.25	1.80
d.00	*	*	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.03	0.01	0.02	0.02	0.02	0.03
d.01	*	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.03	0.04
d.02	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.04	0.04	0.02	0.03	0.03	0.03	0.05
d.03	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.04	0.05	0.03	0.03	0.04	0.04	0.06
d.04	0.02	0.02	0.02	0.03	0.04	0.03	0.03	0.04	0.04	0.06	0.03	0.04	0.05	0.06	0.08
d.05	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.06	0.08	0.04	0.05	0.06	0.07	0.10
d.06	0.02	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
d.07	0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.09	0.13	0.06	0.08	0.09	0.11	0.16
d.08	0.04	0.05	0.06	0.07	0.09	0.07	0.08	0.09	0.11	0.16	0.08	0.10	0.11	0.14	0.20
d.09	0.05	0.06	0.07	0.08	0.11	0.08	0.10	0.11	0.13	0.20	0.10	0.13	0.14	0.16	0.25
d.10	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.16	0.25	0.13	0.16	0.18	0.20	0.32
d.11	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.22	0.32	0.16	0.20	0.22	0.25	0.40
d.12	0.10	0.11	0.14	0.16	0.22	0.16	0.20	0.22	0.25	0.40	0.20	0.25	0.28	0.32	0.50
d.13	0.11	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.28	0.36	0.40	0.63
d.14	0.14	0.18	0.22	0.25	0.36	0.25	0.28	0.36	0.40	0.63	0.32	0.36	0.45	0.50	0.71
d.15	0.18	0.22	0.28	0.32	0.45	0.32	0.36	0.45	0.50	0.71	0.40	0.45	0.56	0.63	0.90

6.2.13 Exposure Time Settings (60kV, 3mA, Long Cone + Rectangular Collimator)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.20	0.28	0.14	0.18	0.22	0.25	0.36
F.01	0.09	0.11	0.13	0.14	0.22	0.14	0.18	0.22	0.25	0.36	0.18	0.22	0.28	0.32	0.45
F.02	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
F.03	0.13	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.32	0.40	0.45	0.63
F.04	0.18	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.45	0.71	0.36	0.45	0.50	0.56	0.90
F.05	0.22	0.25	0.32	0.36	0.50	0.36	0.45	0.50	0.63	0.90	0.45	0.56	0.63	0.71	1.12
F.06	0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.71	1.12	0.56	0.63	0.80	0.90	1.40
F.07	0.32	0.40	0.50	0.56	0.80	0.56	0.63	0.80	0.90	1.40	0.71	0.80	1.00	1.12	1.60
F.08	0.40	0.50	0.63	0.71	1.00	0.71	0.80	1.00	1.12	1.60	0.90	1.00	1.25	1.40	*
F.09	0.50	0.63	0.71	0.90	1.25	0.90	1.00	1.25	1.40	2.00	1.12	1.25	1.60	1.80	*
F.10	0.63	0.80	0.90	1.12	1.60	1.12	1.25	1.60	1.80	*	1.40	1.60	2.00	*	*
F.11	0.80	1.00	1.12	1.40	2.00	1.40	1.60	2.00	*	*	1.60	2.00	*	*	*
F.12	1.00	1.25	1.40	1.60	*	1.60	2.00	*	*	*	*	*	*	*	*
F.13	1.25	1.60	1.80	*	*	*	*	*	*	*	*	*	*	*	*
F.14	1.60	2.00	*	*	*	*	*	*	*	*	*	*	*	*	*
F.15	2.00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
d.00	0.03	0.04	0.05	0.06	0.08	0.06	0.07	0.08	0.10	0.14	0.07	0.09	0.11	0.13	0.18
d.01	0.04	0.05	0.06	0.07	0.11	0.07	0.09	0.11	0.13	0.18	0.09	0.11	0.13	0.16	0.22
d.02	0.05	0.06	0.08	0.09	0.13	0.09	0.11	0.13	0.14	0.22	0.11	0.14	0.16	0.18	0.28
d.03	0.07	0.08	0.10	0.11	0.16	0.11	0.13	0.16	0.18	0.28	0.14	0.16	0.20	0.22	0.32
d.04	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
d.05	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
d.06	0.13	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.32	0.40	0.45	0.63
d.07	0.16	0.20	0.25	0.28	0.40	0.28	0.32	0.40	0.45	0.63	0.36	0.40	0.50	0.56	0.80
d.08	0.20	0.25	0.32	0.36	0.50	0.36	0.40	0.50	0.56	0.80	0.45	0.50	0.63	0.71	1.00
d.09	0.25	0.32	0.36	0.45	0.63	0.45	0.50	0.63	0.71	1.00	0.56	0.63	0.80	0.90	1.25
d.10	0.32	0.40	0.45	0.56	0.80	0.56	0.63	0.80	0.90	1.25	0.71	0.80	1.00	1.12	1.60
d.11	0.40	0.50	0.56	0.71	1.00	0.71	0.80	1.00	1.12	1.60	0.80	1.00	1.25	1.40	2.00
d.12	0.50	0.63	0.71	0.80	1.25	0.80	1.00	1.25	1.40	2.00	1.00	1.25	1.60	1.80	*
d.13	0.63	0.80	0.90	1.00	1.60	1.00	1.25	1.60	1.80	*	1.25	1.60	2.00	*	*
d.14	0.80	1.00	1.12	1.25	2.00	1.25	1.60	2.00	*	*	1.60	2.00	*	*	*
d.15	1.00	1.25	1.40	1.60	*	1.60	2.00	*	*	*	2.00	*	*	*	*

6.2.14 Exposure Time Settings (60kV, 6mA, Long Cone + Rectangular Collimator)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.07	0.08	0.10	0.11	0.16	0.11	0.14	0.16	0.20	0.28	0.14	0.18	0.22	0.25	0.36
F.01	0.09	0.11	0.13	0.14	0.22	0.14	0.18	0.22	0.25	0.36	0.18	0.22	0.28	0.32	0.45
F.02	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
F.03	0.13	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.32	0.40	0.45	0.63
F.04	0.18	0.20	0.25	0.28	0.40	0.28	0.36	0.40	0.45	0.71	0.36	0.45	0.50	0.56	0.90
F.05	0.22	0.25	0.32	0.36	0.50	0.36	0.45	0.50	0.63	0.90	0.45	0.56	0.63	0.71	1.12
F.06	0.28	0.32	0.40	0.45	0.63	0.45	0.56	0.63	0.71	1.12	0.56	0.63	0.80	0.90	1.40
F.07	0.32	0.40	0.50	0.56	0.80	0.56	0.63	0.80	0.90	1.40	0.71	0.80	1.00	1.12	1.60
F.08	0.40	0.50	0.63	0.71	1.00	0.71	0.80	1.00	1.12	1.60	0.90	1.00	1.25	1.40	*
F.09	0.50	0.63	0.71	0.90	1.25	0.90	1.00	1.25	1.40	2.00	1.12	1.25	1.60	1.80	*
F.10	0.63	0.80	0.90	1.12	1.60	1.12	1.25	1.60	1.80	*	1.40	1.60	2.00	*	*
F.11	0.80	1.00	1.12	1.40	2.00	1.40	1.60	2.00	*	*	1.60	2.00	*	*	*
F.12	1.00	1.25	1.40	1.60	*	1.60	2.00	*	*	*	*	*	*	*	*
F.13	1.25	1.60	1.80	*	*	*	*	*	*	*	*	*	*	*	*
F.14	1.60	2.00	*	*	*	*	*	*	*	*	*	*	*	*	*
F.15	2.00	*	*	*	*	*	*	*	*	*	*	*	*	*	*
d.00	0.03	0.04	0.05	0.06	0.08	0.06	0.07	0.08	0.10	0.14	0.07	0.09	0.11	0.13	0.18
d.01	0.04	0.05	0.06	0.07	0.11	0.07	0.09	0.11	0.13	0.18	0.09	0.11	0.13	0.16	0.22
d.02	0.05	0.06	0.08	0.09	0.13	0.09	0.11	0.13	0.14	0.22	0.11	0.14	0.16	0.18	0.28
d.03	0.07	0.08	0.10	0.11	0.16	0.11	0.13	0.16	0.18	0.28	0.14	0.16	0.20	0.22	0.32
d.04	0.09	0.10	0.13	0.14	0.20	0.14	0.18	0.20	0.25	0.36	0.18	0.22	0.25	0.28	0.45
d.05	0.11	0.13	0.16	0.18	0.25	0.18	0.22	0.25	0.28	0.45	0.22	0.28	0.32	0.36	0.56
d.06	0.13	0.16	0.20	0.22	0.32	0.22	0.28	0.32	0.36	0.56	0.28	0.32	0.40	0.45	0.63
d.07	0.16	0.20	0.25	0.28	0.40	0.28	0.32	0.40	0.45	0.63	0.36	0.40	0.50	0.56	0.80
d.08	0.20	0.25	0.32	0.36	0.50	0.36	0.40	0.50	0.56	0.80	0.45	0.50	0.63	0.71	1.00
d.09	0.25	0.32	0.36	0.45	0.63	0.45	0.50	0.63	0.71	1.00	0.56	0.63	0.80	0.90	1.25
d.10	0.32	0.40	0.45	0.56	0.80	0.56	0.63	0.80	0.90	1.25	0.71	0.80	1.00	1.12	1.60
d.11	0.40	0.50	0.56	0.71	1.00	0.71	0.80	1.00	1.12	1.60	0.80	1.00	1.25	1.40	2.00
d.12	0.50	0.63	0.71	0.80	1.25	0.80	1.00	1.25	1.40	2.00	1.00	1.25	1.60	1.80	*
d.13	0.63	0.80	0.90	1.00	1.60	1.00	1.25	1.60	1.80	*	1.25	1.60	2.00	*	*
d.14	0.80	1.00	1.12	1.25	2.00	1.25	1.60	2.00	*	*	1.60	2.00	*	*	*
d.15	1.00	1.25	1.40	1.60	*	1.60	2.00	*	*	*	2.00	*	*	*	*

6.2.15 Exposure Time Settings (70kV, 3mA, Long Cone + Rectangular Collimator)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.05	0.06	0.07	0.08	0.13	0.08	0.10	0.13	0.14	0.20	0.10	0.13	0.16	0.18	0.25
F.01	0.06	0.08	0.09	0.11	0.16	0.11	0.13	0.16	0.18	0.25	0.13	0.16	0.20	0.22	0.32
F.02	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.22	0.32	0.16	0.20	0.22	0.28	0.40
F.03	0.10	0.11	0.14	0.16	0.22	0.16	0.20	0.22	0.25	0.40	0.20	0.25	0.28	0.32	0.50
F.04	0.13	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.50	0.25	0.32	0.36	0.40	0.63
F.05	0.16	0.18	0.22	0.25	0.36	0.25	0.32	0.36	0.45	0.63	0.32	0.40	0.45	0.56	0.80
F.06	0.20	0.22	0.28	0.32	0.45	0.32	0.40	0.45	0.50	0.80	0.40	0.50	0.56	0.63	1.00
F.07	0.25	0.28	0.36	0.40	0.56	0.40	0.45	0.56	0.63	0.90	0.50	0.56	0.71	0.80	1.12
F.08	0.28	0.36	0.45	0.50	0.71	0.50	0.63	0.71	0.80	1.25	0.63	0.71	0.90	1.00	1.60
F.09	0.36	0.45	0.56	0.63	0.90	0.63	0.71	0.90	1.00	1.40	0.80	0.90	1.12	1.25	1.80
F.10	0.45	0.56	0.63	0.80	1.12	0.80	0.90	1.12	1.25	1.80	1.00	1.12	1.40	1.60	*
F.11	0.56	0.71	0.80	1.00	1.40	1.00	1.12	1.40	1.60	*	1.25	1.40	1.80	2.00	*
F.12	0.71	0.90	1.00	1.25	1.80	1.25	1.40	1.80	2.00	*	1.60	1.80	*	*	*
F.13	0.90	1.12	1.25	1.60	*	1.60	1.80	*	*	*	1.80	*	*	*	*
F.14	1.12	1.40	1.60	1.80	*	1.80	*	*	*	*	*	*	*	*	*
F.15	1.40	1.80	2.00	*	*	*	*	*	*	*	*	*	*	*	*
d.00	0.02	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
d.01	0.03	0.04	0.05	0.05	0.08	0.05	0.06	0.08	0.09	0.13	0.07	0.08	0.10	0.11	0.16
d.02	0.04	0.05	0.06	0.06	0.09	0.06	0.08	0.09	0.11	0.16	0.08	0.10	0.11	0.13	0.20
d.03	0.05	0.06	0.07	0.08	0.11	0.08	0.10	0.11	0.13	0.20	0.10	0.11	0.14	0.16	0.25
d.04	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.16	0.25	0.13	0.16	0.18	0.22	0.32
d.05	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.22	0.32	0.16	0.20	0.22	0.28	0.40
d.06	0.10	0.11	0.14	0.16	0.22	0.16	0.20	0.22	0.25	0.40	0.20	0.25	0.28	0.32	0.50
d.07	0.11	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.45	0.25	0.28	0.36	0.40	0.56
d.08	0.14	0.18	0.22	0.25	0.36	0.25	0.28	0.36	0.40	0.63	0.32	0.36	0.45	0.50	0.71
d.09	0.18	0.22	0.28	0.32	0.45	0.32	0.36	0.45	0.50	0.71	0.40	0.45	0.56	0.63	0.90
d.10	0.22	0.28	0.32	0.40	0.56	0.40	0.45	0.56	0.63	0.90	0.50	0.56	0.71	0.80	1.12
d.11	0.28	0.36	0.40	0.50	0.71	0.50	0.56	0.71	0.80	1.12	0.63	0.71	0.90	1.00	1.40
d.12	0.36	0.45	0.50	0.63	0.90	0.63	0.71	0.90	1.00	1.40	0.71	0.90	1.12	1.25	1.80
d.13	0.45	0.56	0.63	0.71	1.12	0.71	0.90	1.12	1.25	1.80	0.90	1.12	1.40	1.60	*
d.14	0.56	0.71	0.80	0.90	1.40	0.90	1.12	1.40	1.60	*	1.12	1.40	1.80	2.00	*
d.15	0.71	0.90	1.00	1.12	1.80	1.12	1.40	1.80	2.00	*	1.40	1.80	*	*	*

6.2.16 Exposure Time Settings (70kV, 6mA, Long Cone + Rectangular Collimator)

[unit : sec.]

Patient	Child					Adult					Large Adult				
Tooth	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
F.00	0.02	0.03	0.04	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.08	0.09	0.13
F.01	0.03	0.04	0.05	0.05	0.08	0.05	0.06	0.08	0.09	0.13	0.07	0.08	0.10	0.11	0.16
F.02	0.04	0.05	0.06	0.06	0.09	0.06	0.08	0.09	0.11	0.16	0.08	0.10	0.11	0.13	0.20
F.03	0.05	0.06	0.07	0.08	0.11	0.08	0.10	0.11	0.13	0.20	0.10	0.11	0.14	0.16	0.25
F.04	0.06	0.07	0.09	0.10	0.14	0.10	0.13	0.14	0.16	0.25	0.13	0.16	0.18	0.22	0.32
F.05	0.08	0.09	0.11	0.13	0.18	0.13	0.16	0.18	0.22	0.32	0.16	0.20	0.22	0.28	0.40
F.06	0.10	0.11	0.14	0.16	0.22	0.16	0.20	0.22	0.25	0.40	0.20	0.25	0.28	0.32	0.50
F.07	0.11	0.14	0.18	0.20	0.28	0.20	0.25	0.28	0.32	0.45	0.25	0.28	0.36	0.40	0.56
F.08	0.14	0.18	0.22	0.25	0.36	0.25	0.28	0.36	0.40	0.63	0.32	0.36	0.45	0.50	0.71
F.09	0.18	0.22	0.28	0.32	0.45	0.32	0.36	0.45	0.50	0.71	0.40	0.45	0.56	0.63	0.90
F.10	0.22	0.28	0.32	0.40	0.56	0.40	0.45	0.56	0.63	0.90	0.50	0.56	0.71	0.80	1.12
F.11	0.28	0.36	0.40	0.50	0.71	0.50	0.56	0.71	0.80	1.12	0.63	0.71	0.90	1.00	1.40
F.12	0.36	0.45	0.50	0.63	0.90	0.63	0.71	0.90	1.00	1.40	0.71	0.90	1.12	1.25	1.80
F.13	0.45	0.56	0.63	0.71	1.12	0.71	0.90	1.12	1.25	1.80	0.90	1.12	1.40	1.60	2.00
F.14	0.56	0.71	0.80	0.90	1.40	0.90	1.12	1.40	1.60	2.00	1.12	1.40	1.80	2.00	2.00
F.15	0.71	0.90	1.00	1.12	1.80	1.12	1.40	1.80	2.00	2.00	1.40	1.80	2.00	2.00	2.00
d.00	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.03	0.03	0.05	0.03	0.03	0.04	0.04	0.06
d.01	0.02	0.02	0.02	0.03	0.04	0.03	0.03	0.04	0.04	0.06	0.03	0.04	0.05	0.05	0.08
d.02	0.02	0.02	0.03	0.03	0.05	0.03	0.04	0.05	0.05	0.08	0.04	0.05	0.06	0.07	0.10
d.03	0.02	0.03	0.03	0.04	0.06	0.04	0.05	0.06	0.07	0.10	0.05	0.06	0.07	0.08	0.11
d.04	0.03	0.04	0.04	0.05	0.07	0.05	0.06	0.07	0.08	0.13	0.06	0.08	0.09	0.11	0.16
d.05	0.04	0.05	0.06	0.06	0.09	0.06	0.08	0.09	0.11	0.16	0.08	0.10	0.11	0.13	0.20
d.06	0.05	0.06	0.07	0.08	0.11	0.08	0.10	0.11	0.13	0.20	0.10	0.11	0.14	0.16	0.25
d.07	0.06	0.07	0.09	0.10	0.14	0.10	0.11	0.14	0.16	0.25	0.13	0.14	0.18	0.20	0.28
d.08	0.07	0.09	0.11	0.13	0.18	0.13	0.14	0.18	0.20	0.32	0.16	0.18	0.22	0.25	0.36
d.09	0.09	0.11	0.13	0.16	0.22	0.16	0.18	0.22	0.25	0.36	0.20	0.22	0.28	0.32	0.45
d.10	0.11	0.14	0.16	0.20	0.28	0.20	0.22	0.28	0.32	0.45	0.25	0.28	0.36	0.40	0.56
d.11	0.14	0.18	0.20	0.25	0.36	0.25	0.28	0.36	0.40	0.56	0.32	0.36	0.45	0.50	0.71
d.12	0.18	0.22	0.25	0.32	0.45	0.32	0.36	0.45	0.50	0.71	0.36	0.45	0.56	0.63	0.90
d.13	0.22	0.28	0.32	0.36	0.56	0.36	0.45	0.56	0.63	0.90	0.45	0.56	0.71	0.80	1.12
d.14	0.28	0.36	0.40	0.45	0.71	0.45	0.56	0.71	0.80	1.12	0.56	0.71	0.90	1.00	1.40
d.15	0.36	0.45	0.50	0.56	0.90	0.56	0.71	0.90	1.00	1.40	0.71	0.90	1.12	1.25	1.80

7. Parts replacement

7.1 Head

1. Turn off the main power switch on the front panel of PHOT-X IIIs 505.
2. Close the balance arm and secure it with a stout cord. The balance arm is spring loaded and it can pop out and cause injury when the x-ray head is removed. (Fig. 1)
3. Remove the screw and yoke cover. (Fig. 2)
4. Remove a M5 screw which secure the nylon clamp. Disconnect the 10P connector in the yoke. (Fig. 3)

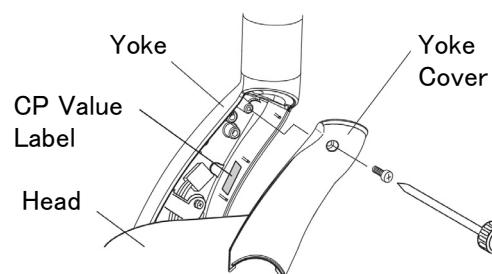


Fig. 2

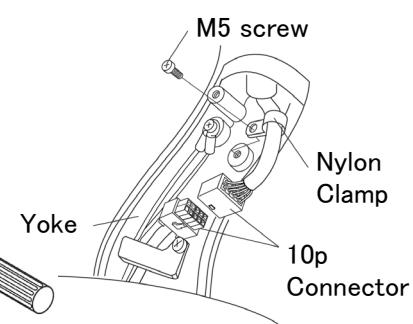


Fig. 3

5. Remove the screw which secures the arm collar. Slide the arm collar upward and temporarily hold it in position with adhesive tape. (Fig. 4)
6. Take out the head key (U shaped key) and remove the x-ray head from the arm. (Fig. 4)
7. Remove the yoke cover from the new x-ray head and insert the shaft of the balance arm into the yoke of the new head. Do not forget to insert the stopper ring. (Fig. 4)
8. Insert the head key into the retaining groove while holding the head in position.
9. Remove the adhesive tape and slide the arm collar downward. Secure it with the arm collar screw.
10. Connect the 10P connector and secure the arm cable with the nylon clamp in the yoke.
11. Remove the cord which holds the arm closed.

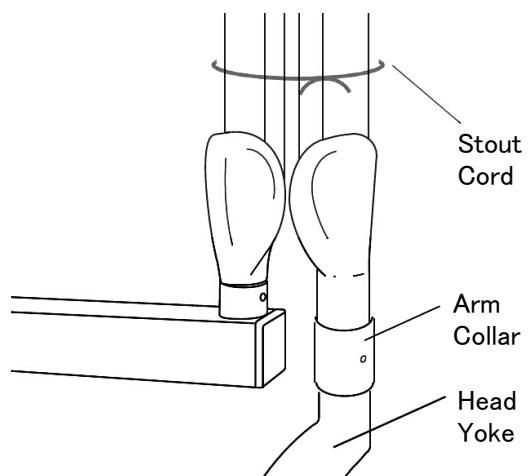


Fig. 1

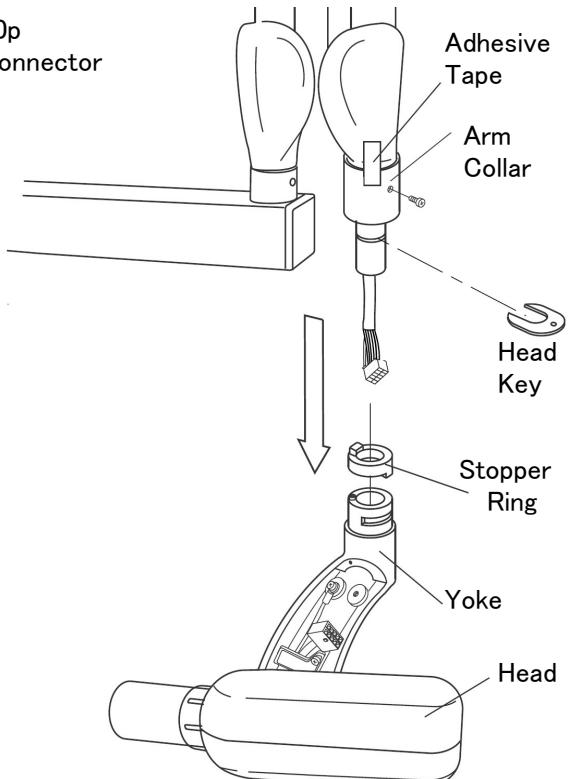
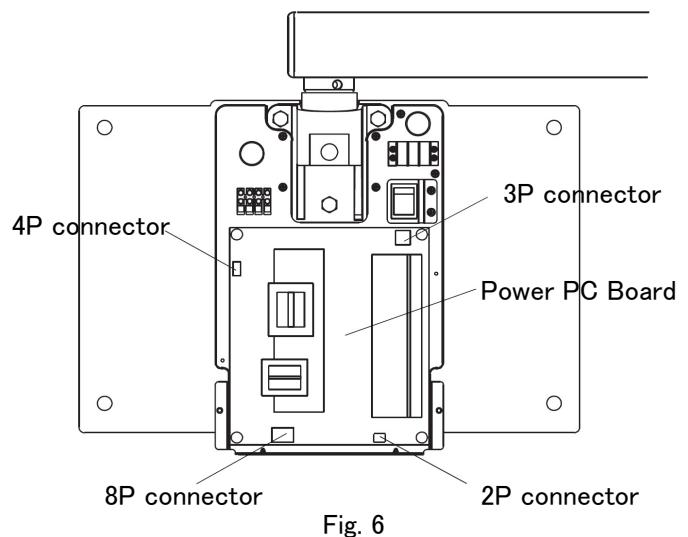
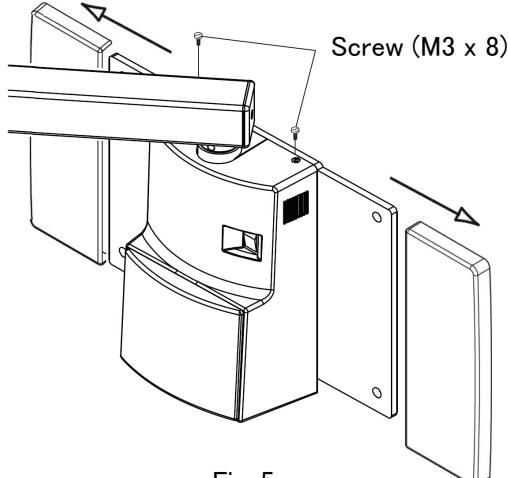


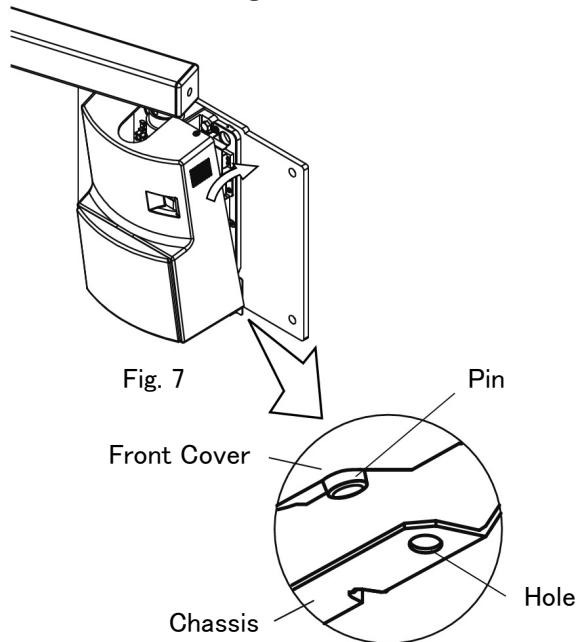
Fig. 4

7.2 Power PC board

1. Turn off the main power at the circuit breaker panel.
2. Slide the side covers to right and left. (Fig. 5)
3. Remove the top two screws and open the front cover. (Fig. 5)
4. Disconnect the four connectors (2P, 3P, 4P and 8P) from the power PC board. (Fig. 6)
5. Remove the four screws which secure the power PC board. Then remove the PC board.



6. Place the new power PC board in position and secure it with four screws. One of the four screws has no flat washer, and it should be placed in the bottom right corner.
7. Attach the four connectors to the power PC board again, being careful not to bend the PC board.
8. Attach the front cover and secure with the two screws which were removed in step 2. (Fig. 7)
9. Slide in the side covers from right and left side of the wall plate.





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